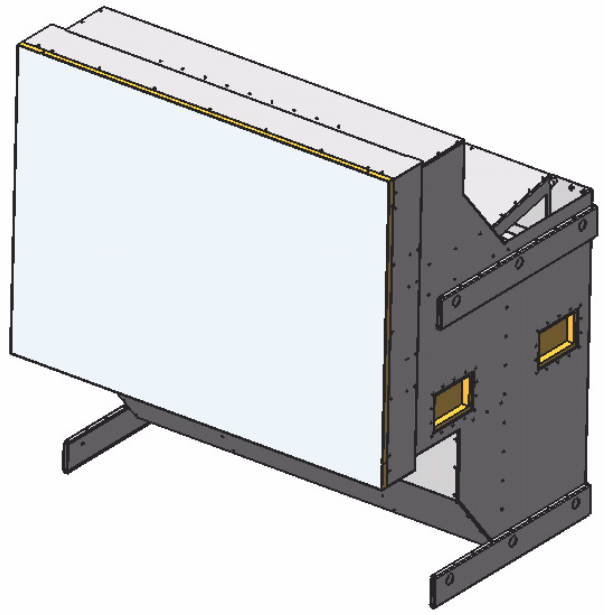
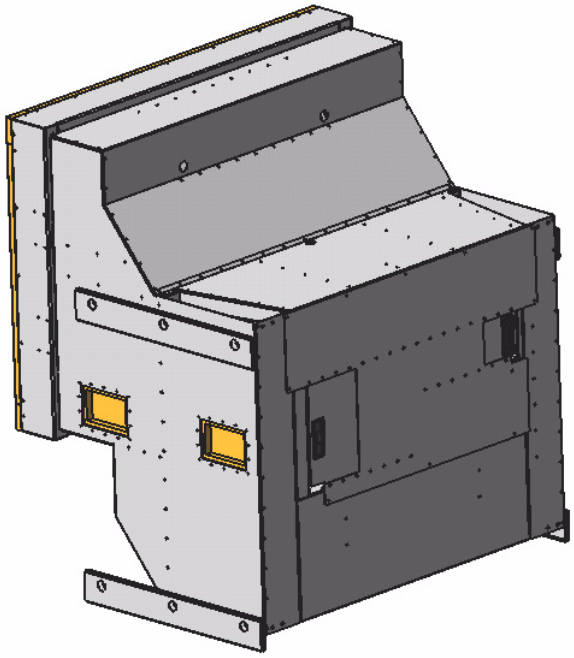
Puma Series

WN-5010-X
WN-5020-XP
WN-5020-UXP





Service Guide

clarity
visual systems

clarity
visual systems

Puma

WN-5010-X, Puma X
WN-5020-XP, Puma XP
WN-5020-UXP, Puma UXP

50" Display Wall Units

Service Manual

072-0001-02
16 November 2004

©2004 by Clarity Visual Systems™, Inc.
All Rights Reserved.

Contents of this publication may not be reproduced in any form without permission of Clarity Visual Systems, Inc.

Trademark Credits

Windows™ is a trademark of Microsoft Corp.
Clarity's Big Picture™ is a trademark of Clarity Visual Systems, Inc.
All other names are trademarks or registered trademarks of their respective companies.

Disclaimer:
The information contained in this document is subject to change without notice.
Clarity Visual Systems Company makes no warranty of any kind with regard to this material. While every precaution has been taken in the preparation of this manual, Clarity Visual Systems shall not be liable for errors or omissions contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Feedback About Manuals

Clarity Visual Systems, Inc., is constantly striving to provide the best product available at a reasonable cost. Part of *this* Clarity product is the manual. If you have found an error in this manual, or if you would like to make any comments about it, you may use this form.
This form is used with the

PUMA SERVICE MANUAL, PART NUMBER 072-0001-02, DATED 16 NOVEMBER 2004.

You may fax this form to Clarity Visual Systems, **Attention: Manuals** at +1 503 570 4657.
Or you may email comments and corrections to **Manuals@ClarityVisual.com**. If you use email, please mention the 070- part number listed above.

What I like about this manual: (We love to read this part.)

What I don't like about this manual: (We read this part, too.)

Error(s) I found in the manual: (Yipes! We thought we were perfect.)

In future manuals of this type, I wish you would …

Thank you for taking the time to help us improve.

Contents

1 Some Basic Information … 1
- 1.1 Basic Puma Background … 2
  - 1.1.1 Using the Remote Control … 4
  - 1.1.2 Interlocks and Fault Override … 6
- 1.2 ESD Can Kill Equipment … 8
- 1.3 Your Personal Safety Is Important … 10

2 Finding the Problem … 13
- 2.1 Reading the On-Screen Code … 14
- 2.2 Reading the Inside LEDs … 16
- 2.3 Using the Factory Settings Menu … 18
- 2.4 Finding Startup Problems … 20
  - 2.4.1 Startup / Lamp Off Sequences … 22
  - 2.4.2 Lamps Will Not Strike … 24
  - 2.4.3 Which Fan Failed? … 26
- 2.5 Fixing Image Problems … 28
  - 2.5.1 Adjusting for Keystone … 30
- 2.6 Mechanical Problems with Walls … 32

3 Replacing Parts … 33
- 3.1 Where Everything Is … 34
- 3.2 Opening and Closing the Screen … 40
  - 3.2.1 Removing the Screen … 42
- 3.3 Removing the Rear Panel … 44
- 3.4 Lowering the Light Tower … 46
  - 3.4.1 Removing the Light Tower … 48
- 3.5 Electronics Module … 50
- 3.6 Power Supply … 52
- 3.7 Lamp Ballasts … 54
- 3.8 Fan: Lamp and Intake … 56
- 3.9 Fan: Exhaust … 58
- 3.10 Fan: Optics (PBS Cooling Fan) … 60
- 3.11 Fan: LCD and Power Supply … 62
- 3.12 Fan: Ballast … 64
- 3.13 Temperature Sensors … 66

4 Service for Optical Engine … 69
- 4.1 Removing the Rear Turn Mirror … 70
  - 4.1.1 Removing the LCD … 72

4.1.2 Removing the Output Fresnel … 74
5 Maintenance … 75
5.1 General Maintenance Guidelines … 76
5.2 Opening and Closing the Screen … 78
5.3 Changing a Lamp – Lowering Light Tower … 80
5.3.1 Changing a Lamp – Replacing the Lamp … 82
5.3.2 Changing a Lamp – Raising Light Tower … 84
5.4 Changing the Rotator or ColorPlus Filter … 86
5.5 Changing the Air Filters … 88
5.6 Cleaning the Screen and Mirrors … 90
6 Reference Material … 93
6.1 Menu Structures … 94
6.2 Remote Control Functions … 118
6.3 Analog Mode Tables … 122
6.4 Puma Drawings … 130
6.5 Connector Wiring … 134
6.6 Regulatory Information … 136
6.7 Meaning of Terms … 138
6.8 Specifications for Puma … 142
Index … 145

1 Some Basic Information

1.1 Basic Puma Background … 2

1.1.1 Using the Remote Control … 4

1.1.2 Interlocks and Fault Override … 6

1.2 ESD Can Kill Equipment … 8

1.3 Your Personal Safety Is Important … 10

1.1 Basic Puma Background

If you are new to Puma and Clarity Visual System products, start here.

This Service Guide covers several different models of Puma plus all the options and variations thru 16 NOVEMBER 2004.

Puma models covered in this manual

Model Name	Model Number	Native Resolution[1]	# of Lamps	Notes
Puma XP	WN-5020-XP	1024 × 768	2	
Puma UXP	WN-5020-UXP	1600 × 1200	2	
Puma X	WN-5020-X	1024 × 768	1	Can be upgrade to 2 lamps

1. Resolution of the LCD.

All Pumas accept these input types:

- analog computer pictures from UXGA (1600 × 1200) down to VGA (640 × 480); RGB and RGBS in the same range: HDTV 1080i and 720p.
- digital computer pictures (DVI)
- video (with VIM option) for NTSC, PAL and SECAM.

Weight

The Puma with screen attached weighs 160 lbs (72.7 kg).

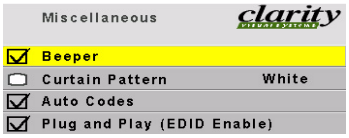
1.1.1 Using the Remote Control

Lots of troubleshooting is done with remote control.

The remote control lets you control the Puma and get it setup and adjusted initially.

A complete description of the remote control functions is found in “Menu Structures” on page 94.

Remote control activity



Normally the Puma beeps once whenever a remote button is pressed. This beeping can be turned off in the Miscellaneous menu.

Even if Beeper is not checked, the Puma will beep when the LAMP OFF or LAMP ON button is pressed.

The Puma will **triple beep** when any command is given from the remote that the Puma cannot execute. Pressing the LAMP ON button when the lamps are already on or when an interlock is open will cause a triple beep. This means, “I can’t do it.” The triple beep occurs whether Beeper is checked or not checked.

If the remote does not work

Check the Remote LED on the electronics module. It should flicker briefly each time a remote button is pressed, whether or not the command can be executed. If this LED is on all the time, it means the environment has lots of IR (infra-red) radiation in it, and that is probably overwhelming any commands from the remote.

Check the batteries in the remote.

Some of these “hot keys” go directly to the most-used menus. Some of them take you through a sequence of menus, if you push the button more than once. SOURCE and SETUP perform special actions without menus.

PREV reverts to the previous menu.

MENU opens the Main Menu.

ENTER
goes to the next menu, when it has a right-pointing arrow;
toggles the highlighted item on and off;
executes the selected command.

The up-down arrow keys move the select bar (yellow highlight).

The +/– (left-right) arrow keys change values in the selected item. The right arrow can also take you to the next menu.

1.1.2 Interlocks and Fault Override

There are times when it is necessary to bypass the safety interlocks in order to service or test equipment.

What trips the interlocks?

- removing the rear panel
- removing the light shield

These actions open a normally closed switch, and the lamps go off.

These interlocks are easy enough to bypass by taping the switch closed.

> ***WARNING***
> If you tape these switches closed for service or testing, be sure to un-tape them before you leave.

What else turns off the lamps?

- any temperature sensors reads over its trigger point *and* temperature monitoring is on
- any fan fails

Either of these faults will turn off the lamps and prevent them from striking.

Fault override

> ***WARNING***
> Fault override should only be used while actively diagnosing problems. It should **never** be used as a long-term workaround for a fault.

First, press the MONITOR button on the remote to activate the On-Screen Code ("Reading the On-Screen Code" on page 14) to determine the cause. If the fault is one of these:

- Interlock open (Red-Red-Red)
- Any fan stopped (Red-Amber)
- Temperature over limit (Red-Amber-Red)

If necessary, you can override the fault to start the lamps by doing this:

1. Press the arrow keys on the remote in this order: up, up, right, left, down.
2. Press LAMP ON. (If the lamps are in the cool-down period, you will have to wait until that is finished.)

This action will turn on the lamps even when there are faults, such as interlock open, temperature over the limit. It will *not* override faults that absolutely prevent lamps from striking, such as 350 V missing or both lamps failed.

> ***CAUTION***
> The Puma continues to be in this state until AC power is cycled. When you are finished troubleshooting, be sure to cycle AC power off, then on again.

If the **temperature** was over its limit, check the Temperature menu and *un*check Shutdown on Over Temperature. See "Diagnostics: Temperature" on page 104.

If the problem was a **fan**, look at the electronics module to see which fan LED is red.

The Puma will continue to act like there is a fault. The On-Screen Code will still show the highest priority fault and the Ready LED on the electronics module will be red. The cube status menu and temperature menu will show all failures as they apply. There will be a line on the cube status menu that says "Fault Override is On."

While Fault Override is in effect, nothing will make the Puma shut down, not even new faults, such as opening the rear panel, so be very careful.

A lamp off command will turn off the lamps, as usual, and reset fault override so that any new fault, or any remaining fault, will prevent the lamps from striking.

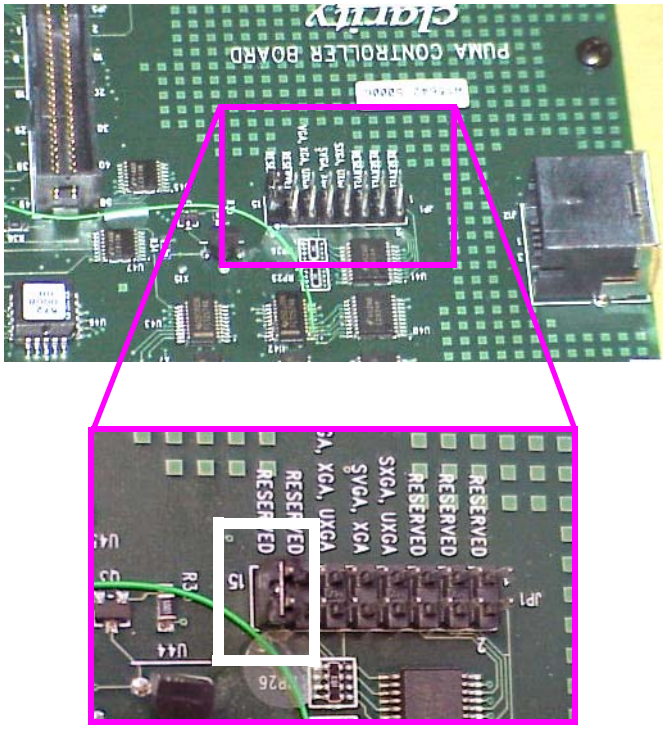
The RS232 operation `fault.override` can be read or set. Setting it to on is the same as using the remote arrow key sequence. When read, it will return ON if it has been set to on by a previous command, or it is on from a remote control key sequence, or if the fault bypass jumper is on (see below).

If the fault that shut off the lamps was that the 350V supply failed or both lamps failed, the Puma will not turn on the lamps. However, it will try.

Fault override with bypass jumper

Placing a jumper between pins 15 and 16 on JP1 will bypass all faults.

> ***WARNING***
> The bypass jumper should only be used while actively diagnosing problems. It should **never** be used as a long-term workaround for a fault.


PUMA CONTROLLER BOARD
RESERVED
RESERVED
RESERVED
RESERVED
SXGA, UXGA
SVGA, XGA
XGA, UXGA
15
JP1

Pins 15 & 16

1.2 ESD Can Kill Equipment

ESD – electro-static discharge – can literally kill electronic equipment. The components in this display, particularly the electronics module, are very susceptible to ESD. Take precautions by using an approved grounding strap when handling these parts.

MOS-FETs and J-FETs (two types of **f**ield-**e**ffect **t**ransistors) are wonderful components in circuits. They provide high amplification with very little power consumption, but they are extremely vulnerable to static discharge. These components are used in the modules (electronic boxes) in this product.

Static electricity can easily build up in your body, and you won't even know it. Rubber-soled shoes on vinyl floors, walking across carpet or rugs, even swiveling in your chair can build up enough static electricity to zap (kill) a FET. If you kill the FET, you kill the module it is in.

To prevent electro-static discharge (ESD)

Use a wrist ground strap whenever you remove and handle any of these modules:

- the **electronics module**
- the **lamp ballast**
- the **power supply**

Before you remove any module listed above, connect your wrist strap to the main chassis.

Before you install a new module, connect your wrist strap to the main chassis.

If you carry the module across carpet, connect the wrist strap to a ground point on the module.

When you pack a module for shipping

Use an anti-static bag, if possible. If you don't have an anti-static bag, wrap the module in aluminum foil before packing it.

Never, never pack the bare module in loose, styrofoam "peanuts." When these styrofoam pieces touch the connectors, they can easily zap a FET.

ESD Precautions

for handling electronics modules
power supplies
ballasts

CAUTION

When you remove an electronic "box," connect a wrist strap to the main chassis before you start.

CAUTION

When you walk with an electronic part, always connect a wrist strap to a ground point (the case) on the part.

CAUTION

When you ship a part separately, put it in an anti-static bag, or wrap it in aluminum foil, before packing it in a carton.

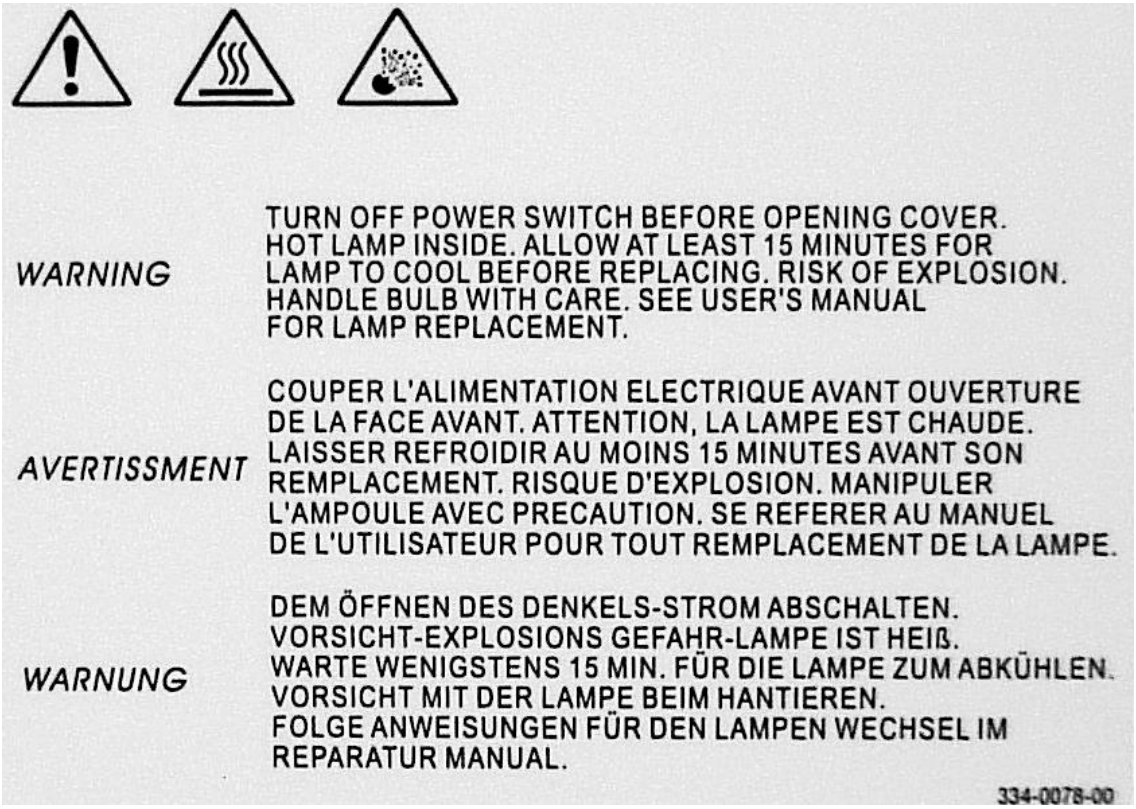
CAUTION

Never put the bare, unwrapped device in an ordinary plastic bag or styrofoam of any kind.

1.3 Your Personal Safety Is Important

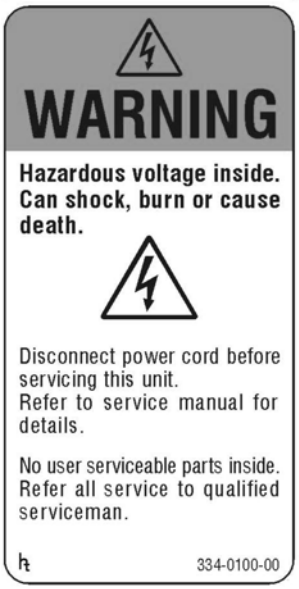
There are four basic reasons to be careful when servicing a Puma:

- **Heat**: The lamps are very hot when lit, and the glass stays hot for many minutes after the lamp is turned off.
- **High voltage**: The lamps are struck (started) with about 20,000 volts. The lamp terminals carry a voltage of about 75 volts even when they are off.
- **UV radiation**: Ultra-violet radiation can seriously damage you eyes. If you must work with a Puma when the lamps are on and the light shield or rear is removed, wear UV protective goggles.
- **Glass**: The screen is glass, the mirrors are glass and the lamps are glass. Glass breaks.


WARNING
TURN OFF POWER SWITCH BEFORE OPENING COVER.
HOT LAMP INSIDE. ALLOW AT LEAST 15 MINUTES FOR
LAMP TO COOL BEFORE REPLACING. RISK OF EXPLOSION.
HANDLE BULB WITH CARE. SEE USER'S MANUAL
FOR LAMP REPLACEMENT.
AVERTISSMENT
COUPER L'ALIMENTATION ELECTRIQUE AVANT OUVERTURE
DE LA FACE AVANT. ATTENTION, LA LAMPE EST CHAUDE.
LAISSER REFROIDIR AU MOINS 15 MINUTES AVANT SON
REMPLACEMENT. RISQUE D'EXPLOSION. MANIPULER
L'AMPOULE AVEC PRECAUTION. SE REFERER AU MANUEL
DE L'UTILISATEUR POUR TOUT REMPLACEMENT DE LA LAMPE.
WARNUNG
DEM ÖFFNEN DES DENKELS-STROM ABSCHALTEN.
VORSICHT-EXPLOSIONS GEFAHR-LAMPE IST HEIß.
WARTE WENIGSTENS 15 MIN. FÜR DIE LAMPE ZUM ABKÜHLEN.
VORSICHT MIT DER LAMPE BEIM HANTIEREN.
FOLGE ANWEISUNGEN FÜR DEN LAMPEN WECHSEL IM
REPARATUR MANUAL.
334-0078-00

WARNING

If you are not a qualified service technician, you should not do anything shown in this Service Guide.


WARNING
Hazardous voltage inside.
Can shock, burn or cause death.
Disconnect power cord before servicing this unit.
Refer to service manual for details.
No user serviceable parts inside.
Refer all service to qualified serviceman.
334-0100-00

WARNING
High intensity light.
Do not look into the projection lens while unit is on.
WARNING
Possible UV Exposure
Use protective eye wear while operating with screen removed.
334-0077-00

2 Finding the Problem

2.1 Reading the On-Screen Code … 14

2.2 Reading the Inside LEDs … 16

2.3 Using the Factory Settings Menu … 18

2.4 Finding Startup Problems … 20

2.4.1 Startup / Lamp Off Sequences … 22

2.4.2 Lamps Will Not Strike … 24

2.4.3 Which Fan Failed? … 26

2.5 Fixing Image Problems … 28

2.5.1 Adjusting for Keystone … 30

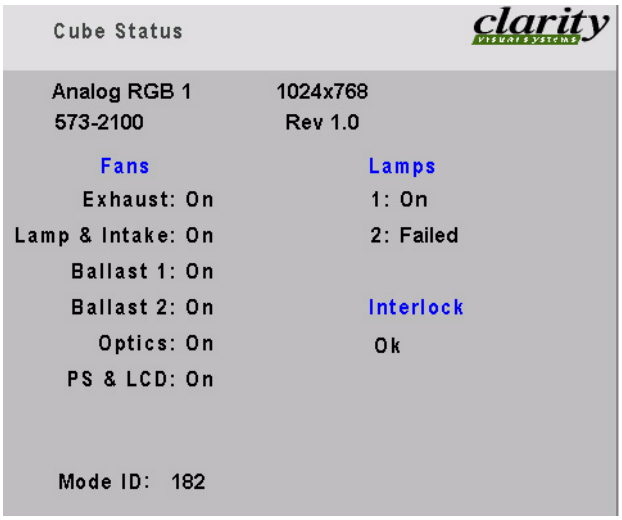
2.6 Mechanical Problems with Walls … 32

2.1 Reading the On-Screen Code

Press MONITOR *to see the code. The code is visible even when the lamps won't light.*

The On-Screen Code can show you what's wrong even when the lamps won't light.

Press the MONITOR button on the remote. If the lamps are working, you should see the Cube Status menu. You may also see a blinking or steady red or



amber light on the screen. (It may be hard to see when the lamps are lit.)

If the lamps are *not* lit, or they won't light, press the MONITOR button to start a pattern of red and amber lights flashing on the screen. Check the pattern against the table opposite to find the problem.

Note that patterns starting with red are problems that will shut off the lamps and prevent them from striking. Patterns starting with amber do not shut off the lamps or prevent them from striking.

✎ If there is more than one problem, only the problem with the highest priority (lowest number) will show its code.

- **Interlock open** is either the rear panel open or the front light shield not in place.
- **Any fan stopped** will shut off the lamps.
- **350V missing** means the power supply is no longer providing this voltage to the ballasts, so the lamps can't light.
- **Temperature over limit (lamps off)** means that temperature monitoring is on in the Temperature menu. Temp Mon is on by default. However, it is not necessary in all applications. Try turning it off.

✎ If temperature monitoring is on and a temperature sensor becomes defective and reads too high, the lamps cannot be lit.

- **Both lamps failed** to strike.

The conditions listed above this point will force the lamps off and, if Auto Codes is checked in the Miscellaneous menu, cause the On-Screen Code to start displaying on the screen immediately.

After the problem is fixed, all these conditions require you to cycle AC power off and then on to reset the status and allow lamps to light again.

- **Lamps off (wait, auto off)**: Lamp Saver is enabled and turned off the lamps. Before they were allowed to cool completely, the source was restored or the lamps were commanded on manually. The lamps will turn on in less than one minute.
- **Wait** means the lamps are in the cooling cycle, about 45 seconds. This cycle starts immediately after the lamps are turned off and about 10 seconds after AC is applied. See "Startup / Lamp Off Sequences" on page 22.

The problems listed below do *not* turn off the lamps.

- **Temperature over limit (lamps not off)** means that at least one of the sensor is registering a temperature above its trip point, but Temp Mon is Off (normal) in the Temperature menu.
- **One lamp failed** shows you that one of the lamps has failed, but not both of them.
- **Temperature near limit** means one of the temp sensors in near its trip point but not there yet.
- **Lamps off (lamp saver)** means the lamp saver feature has turned the lamps on. If a valid source is detected, the lamps will turn on again. Or you can turn them on manually.
- **Lamps off (ready)** is not a problem. It means the Puma is waiting for an on command. Everything is ready to go. Press ON to light the lamps.
- **Lamps on, no alarms** means that lamps are on. If the screen is black when you see this, it is not because the lamps are off. There is some other cause.

Press MONITOR once to see the On-Screen Codes. Press it again to turn them off.

Puma XL/UXL On-Screen Codes

	Condition	Priority	Each block represents 0.2 seconds	
Starts with Red Lamps are off.	Interlock open	1	R R R	See Footnote 2
	Any Fan stopped	2	R Amber	
	350 V missing	3	R R Amber	
	Temperature over limit [1]	4	R Amber R	
	Both lamps failed	5	R R	
	Lamps off (wait, auto off) [6]	6	R R Amber Amber	
	Wait (lamps are cooling)	7	R R R R	
Starts with Amber. Lamps not affected.	Temperature over limit [3]	8	Amber R R	
	One lamp failed	9	Amber R Amber	
	Tempreature near limit [5]	10	Amber R	
	Lamps off (lamp saver) [4]	11	Amber Amber R	
	Lamps off (ready) [4]	12	Amber Amber	
	Lamps on, no alarms	13	Amber on continuously	

R = Red To show the code, press MONITOR button once.

[1] Temperature over limit when Over Temp Monitoring is On.

[2] To turn lamps on, you must first cycle AC power off, then on. These five events start the On-Screen Codes automatically, if Auto Codes in the Miscellaneous menu is checked.

[3] Temperature over limit when Over Temp Monitoring is Off. Lamp state not affected.

[4] A Lamp On command from the remote or from RS232 commands will turn lamps on.

[5] At least one temperature sensor is within 5°C of trigger point.

[6] Lamp Saver turned lamps off; lamps are cooling and will turn on at end of cooling period.

2.2 Reading the Inside LEDs

The inside LEDs on the electronics module can indicate the problem more specifically that the On-Screen Code.

The LEDs are along the bottom of the electronics module on the right wall (looking from the front) of the chassis. These tell you the state of various parts of the Puma.

The LEDs may in off, green, amber or red. They do not blink. However, the RS232 and Remote IR turn on for less than a second.

Power up sequence

When AC power is applied, the electronics module takes a few seconds to initialize.

1. After a few seconds it the Source, Temp and Interlock LEDs are green. When the electronics module is working properly and has power, these LEDs are never off.
2. The fans start, and all Fan LEDs are green.
3. The Ready LED is amber.
4. After 30 seconds, the Ready LED turns green.
5. The fans stop and the Fan LEDs go off.

The Puma is now waiting for a On command from you.

Lamp on sequence

6. Puma receives a Lamp On command from the remote or from RS232 data.
7. All fans start and Fan LEDs are green.
8. Lamp LEDs turn amber while striking the lamp.
9. Lamp LEDs turn green when the lamp is lit. (Red if lamp fails to light.)

With Auto Lamp On

When Auto Lamp On is checked in the Misc Options menu, the Ready LED does not go to amber and the fans do not stop. The Puma tries to strike the lamps immediately, so the sequence skips from Step 4. to Step 8.

Failure to strike lamps

The following conditions will prevent the lamps from striking.

- Any fan stopped; any Fan LED is red.
- Interlock open (rear panel or light shield removed); Interlock LED is red.
- Any temperature sensor is over its limit *and* Temperature Monitoring is *on*.

About the Fan LEDs

There are 6 fan LEDs, but there are 11 fans, so some of the LEDs indicate the condition of more than one fan.

For the multiple fan LEDs, if any one of the fans in the group fails, the LED turns red.

Location of Fans

Fan	Number of fans	Location (LOOKING FROM REAR)
Exhaust	1	One fan next to the exhaust chimney
Lamp/Intake	4	Three fans behind the lamps, one fan to the right of the lamps
Ballast 1	1	Below Ballast 1 (right)
Ballast 2	1	Below Ballast 2 (left)
Optics	1	On bottom left side of the light tower
PS & LCD	3	One fan to the left of the power supply. Two fans to the left of the LCD.

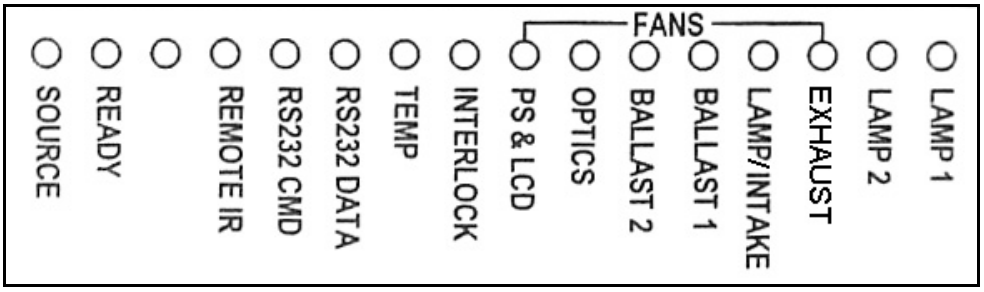
If *any one* fan fails, the lamps will go off. All fans must be operating to turn on the lamps.

Interlocks

There are two interlocks: one opens when the rear cover is removed. The other opens when the light shield is removed or not in its operating position. If either interlock switch is open, the lamps cannot light.

The Meaning of the LEDs

LED Name	When the LED is… Off	Green	Amber	Red
Lamp 1	Lamp off	Lamp on	Lamp striking	Lamp failed
Lamp 2				
Fans: Intake, Lamp/Exhst, Ballast 1, Ballast 2, Optics, PS & LCD	Fan is off	Fan is running	Fan failed recently, but is now running.	Fan failed; lamps disabled
Interlock	No power to electronics	Interlocks closed; lamps enabled	Interlock was open, now closed. Must cycle AC power to reset and enable lamps.	Interlock open; lamps disabled
Temp	No power to electronics	All temps within their ranges	One temperature near its limit	One temperature over its limit
RS232 Data	No command received	Received any command		
RS232 CMD		Received command "meant for me"		
Remote IR	Not receiving IR now	Receiving IR radiation		
(not used)				
Ready	Lamps on, or no power	Ready for On command; lamps enabled	Waiting for lamps to cool	Lockout; must cycle AC power to reset
Source	No power to electronics	Selected source is valid		Source absent or selected source not valid



2.3 Using the Factory Settings Menu

The Factory Settings menu has special controls for service technicians only.

To open the Factory Settings menu:
1. Press MENU on the remote
2. Select Program Information and press ENTER.
3. Press the arrow keys on the remote in the following order: up, up, right, left, down.

Lamp Service lets you turn the lamps on and off separately for testing and put up a test pattern. It is used primarily to test brightness uniformity.

> ⚠ ***CAUTION***
> Turning the lamps on and off rapidly can seriously shorten lamp life. Let them cool down for one minute before turning them on. Let them heat up for five minutes before turning them off.

LCD Calibration should not be touched in the field. This procedure is done at the factory and makes an slight adjustment to black levels. Do not use this control for adjusting black levels in the field.

Gamma turns off (when not checked) the standard curve relating incoming voltage to brightness. Turning it off will make the colors and brightness look poor. It also bypasses the color balance settings.

Flip Horizontal/Vertical flips the picture but not the menus.

Lamps Installed tells the Puma how many lamps to expect. For Puma X this is 1. For Puma XP and UXP this is 2. If you upgrade from Puma X to Puma XP, you must change this setting to 2.

Interlock Monitoring when unchecked is the same as putting a jumper on pins 15 & 16. See "Interlocks and Fault Override" on page 6.

> ⚠ ***WARNING***
> Be sure to UNcheck this box before returning the Puma to operational status.

Clear last 10 inputs memory resets the system that remembers the mode of the last 10 inputs. This memory speeds the action of matching an incoming signal (picture) to one of the modes in the mode list, as shown in the "Analog Mode Tables" on page 122.

If a signal is *close* to one of the 10 recently used modes in the memory, that mode is used. Sometimes this is not the correct mode, but the Puma keeps coming back to it. Dumping (clearing) this memory may overcome the problem.

Reset to Factory Defaults sets everything back to the way it was when it left the factory. This is *not* recommended. Color Balance, Input Levels and many other settings will be wrong for your installation.

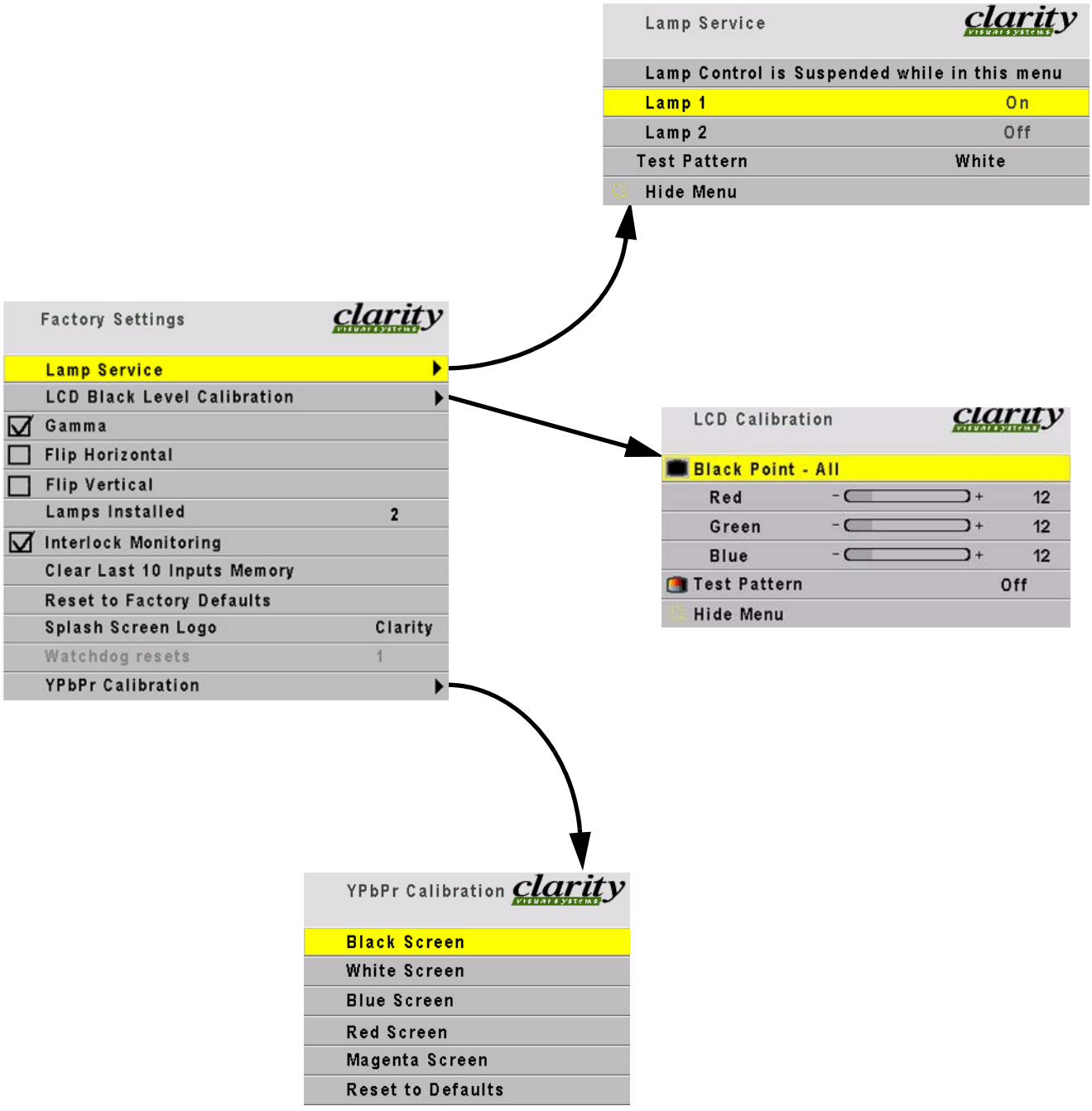
Splash Screen Logo changes the logo. If your customer wants a splash screen with its logo, contact your Clarity salesperson.

Watchdog resets is an indicator, not an adjustment. The lamp control system leaves a trace of what it is doing in non-volatile memory. On startup (AC power up) the system looks at this trace. If the trace says the lamps were striking, the system assumes this restart was a result of a watchdog timer reset and counts it.

> ✎ If you cycle AC power during lamp strike, you will get a count on this counter.

If this number is 1 or 2, there is no problem. If it gets higher, there may be a problem. You cannot reset this counter.

YPbPr Calibration can be performed in the field, although it is usually not necessary.
1. With a black picture from a YPbPr source, select Black Screen and press ENTER.
2. With a white picture from a YPbPr source, select White Screen and press ENTER
3. For the next steps, you can use the Blue and Red Screens, or you can do both at once if the YPbPr source can produce a magenta picture.


Lamp Service
clarity
Lamp Control is Suspended while in this menu
Lamp 1 On
Lamp 2 Off
Test Pattern White
Hide Menu
Factory Settings
clarity
Lamp Service
LCD Black Level Calibration
Gamma
Flip Horizontal
Flip Vertical
Lamps Installed 2
Interlock Monitoring
Clear Last 10 Inputs Memory
Reset to Factory Defaults
Splash Screen Logo Clarity
Watchdog resets 1
YPbPr Calibration
LCD Calibration
clarity
Black Point - All
Red - + 12
Green - + 12
Blue - + 12
Test Pattern Off
Hide Menu
YPbPr Calibration
clarity
Black Screen
White Screen
Blue Screen
Red Screen
Magenta Screen
Reset to Defaults

2.4 Finding Startup Problems

If the screen is black, it may be a startup problem. Here are some suggestions, but you will have to read other parts of this guide to fix the problem.

Screen is black
There are many reasons the screen might be black. The first thing to check is whether the lamps are on. Press MONITOR on the remote. You will either see the Cube Status menu or you won't.

Screen black: menu visible

Cause of black screen	Fix
Black test pattern on	Check Test Pattern menu
Curtain on and curtain pattern is black	Press Curtain button
No source	Press FREQ/PHASE button or check Source LED; press SOURCE to try to find valid picture.
Source is black[1]	Try another source, or this source into another Puma. Swap the electronics module with a known good one.

1 If the picture is all blue, check the source. Some VCRs generate a blue screen when they have no tape inserted.

Screen black: menu not visible

Cause of black screen	Fix
If red or amber lights flash on screen…	see "Reading the On-Screen Code" on page 14 for help.
Interlock open	Check On-Screen Code (page 14) or LEDs (16). Two interlocks: light shield and rear panel.
Lockout	Check On-Screen Code or LEDs. Cycle AC power.
No 350 volts	Check LED on power supply.
No 350 volts	Check large 350 volt cable from power supply to ballasts

Screen black: menu not visible

Cause of black screen	Fix
No AC power	Switch on power supply is lit when it is on and there is AC supplied to it
Power supply not connected to electronics module	If AC power switch is lit, look at on side of the supply. Is there a large connector plugged in? This connector goes to the electronics module.
No control	Check small control lines from electronics module to ballasts.
Both lamps failed	Try one lamp known to be good.
Both ballasts failed	Try one ballast known to be good.
No turn mirror	Check below light tower. Did you forget to replace it?
Object blocking light	Check "shelf" in light shield.

Watch the inside LEDs while you turn on AC power.
- Read "Startup / Lamp Off Sequences" on page 22 to know what you should expect.
- Then read "Reading the Inside LEDs" on page 16 to know what the LEDs and trying to tell you.

One Lamp Will Not Light

Cause	Fix or Test
Bad lamp	Try a lamp known to be good. Use a lamp you have seen work elsewhere.
Bad ballast	Try a ballast known to be good.
Bad connections	Check the connections to the ballast, both the large connector (350V) and the smaller one (control).

Screen is white

If the screen is all white, press MONITOR on the remote.

Screen white: menu visible

Cause of white screen	Fix
White test pattern on	Check Test Pattern menu
Curtain on and curtain pattern is white	Press Curtain button
Source is white	Try another source, or this source into another Puma.

Screen white: menu not visible

Cause of white screen	Fix
LCD cable is not connected; this is the *only* cause of a white screen and no menus.	Check LCD cable connection at the electronics module and at the LCD end

2.4.1 Startup / Lamp Off Sequences

It's helpful to know how things should work.

The startup sequence

This is what is *suppose* to happen when you turn on the master AC switch on the power supply.

Normal Power Up Sequence

Time (sec)	Action	Event	LEDs					
			Ready	Temp	Interlock	Fans	Lamps	Other LEDs
0	AC switch on	AC switch lights. If it doesn't, nothing else happens.						Does not matter
1		Some LEDs may flash on and off						
10		BALLAST SUPPLY LED on power supply lights. If it doesn't, lamps won't light. Lamps cannot be lit until the next step.	Amber	Green	Green	Green	Off	
70		Fans stop. Lamps can now be lit.	Green	Green	Green	Off	Off	
Later …	On command received	Fans start. Lamps attempt to strike.	Off	Green	Green	Green	Amber	
+10		Lamps light, come to full brightness slowly.	Off	Green	Green	Green	Green	

How a lamp strikes

The power supply feeds 350V to the ballast. When the ballast receives an On command from the electronics module, it provides about 15kV to the lamp. This strikes an arc in the lamp.

Immediately the ballast begins to lower the voltage to the lamp as the lamp draws more current. Eventually the lamp voltage is around 100V.

About 6 seconds after the On command, the electronics module "looks" at the ballast to see if it is supplying current to the lamp. If it is, the lamp is on, and that lamp LED goes green.

If it the lamp is not drawing current from the ballast, the electronics module shuts the lamp off, waits 45 seconds, and tries to strike it again, checking 6 seconds later.

If the lamp does not strike and stay struck after 3 attempts, the electronics module marks the lamp as "failed" and turns the LED red. It will not try this lamp again. To reset the failed status, you must cycle AC power so the electronics module is initialized again.

If a sense line between the ballast and the electronics module, the lamp may strike, but it will turn off after a few seconds.

If the voltage at the lamp, after it is on, exceeds 110 VAC, the ballast will turn the lamp off. In most cases, this is caused by the lamp.

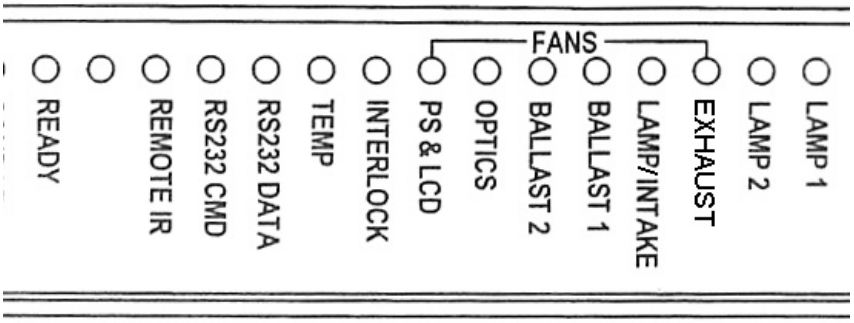
If **Auto Lamp** in the Miscellaneous menu is checked, the Puma does not wait for a lamp-on command.

Auto Lamp On Power Up Sequence

Time (sec)	Action	Event	LEDs					
			Ready	Temp	Interlock	Fans	Lamps	Other LEDs
0	AC switch on	AC switch lights. If it doesn't, nothing else happens.						Does not matter
1		Some LEDs may flash on and off						
10		BALLAST SUPPLY LED on power supply lights. If it doesn't, lamps won't light.	Amber	Green	Green	Green	Off	
70		Fans run. Lamps attempt to strike.	Off	Green	Green	Green	Amber	
+10		Lamps light, come to full brightness slowly. Fans continue to run.	Off	Green	Green	Green	Green	

Lamp Off Sequence

Time (sec)	Action	Event	LEDs					
			Ready	Temp	Interlock	Fans	Lamps	Other LEDs
0	Lamp Off command received	Lamps go off immediately. Fans continue to run.	Amber	Green	Green	Green	Off	Does not matter
45		Fans stop. Lamps may now be lit again.	Green	Green	Green	Green	Off	



2.4.2 Lamps Will Not Strike

Here are some possible reasons the lamps will not strike. This list may not cover all possibilities.

When you try to start the lamps with the remote, you may get a triple beep. This means the Puma is not going to strike the lamps. Why not?

Interlock open

If the Interlock LED is red, an electrical interlock switch is open. One switch is closed when the rear panel is in place. The other is closed when the light shield is in place. If either switch is open, the lamps will go off and not come on again until these switches are both closed. (See "Reading the Inside LEDs" on page 16.)

Waiting period

If the Ready LED is amber, the system is in a waiting period, waiting for the lamps to cool before striking them. This period always occurs after the lamps are turned off. It also occurs soon after AC power is applied or re-applied.

Lockout

If the Ready LED is red, the system is in lockout. You must cycle the AC power off, then on to get it out of lockout. Lockout occurs when

- either interlock is open
- any temperature sensor goes over its trip point *and* temperature monitoring is turned on in the Temperature menu.
- any fan stops
- 350 volt supply fails

Whenever the Ready LED is red, you must cycle AC power off and on to reset this state.

Temperature too high

Temperature sensors normally do *not* force the lamps off, but you can set this feature on in the menu ("Diagnostics: Temperature" on page 104). If temperature monitoring is on, any temperature that goes over its trigger point will cause the lamps to shut off.

✎ If a temperature sensor becomes defective, it may be impossible to boot up the Puma without bypassing all interlocks (see "Interlocks and Fault Override" on page 6). Many users turn off temperature monitoring.

Fan stopped

If any fan stops for any reason, the lamps go off. there are jumpers on the fan boards to let you temporarily bypass a stopped fan. Use with caution.

350V missing

If the 350 volt power supply in the power module fails the lamps will not turn on. This power goes to the ballasts. Check the LED on the power module itself to see if the 350V is active.

Both lamps dead or disconnected

Try a known good lamp.

Both ballasts dead or disconnected

Try a known good ballast.

⚠ ***WARNING***

Use the interlock bypass described below with caution. Bypassing the interlocks to turn on lamps can be dangerous.

Bypassing the interlocks

Sometimes when the lamps will not strike it would be handy to be able to look at the menus to see why, or to change a condition that prevents striking the lamps. For instance, if one of the temperature sensors is giving a false high reading, the lamps will not strike.

To temporarily bypass this type of interlock and turn on the lamps anyway, do the following:

1. Press the arrows keys in the up, up, right, left, down sequence, as you would to see the Factory Settings menu.
2. Then immediately press the LAMP ON button.

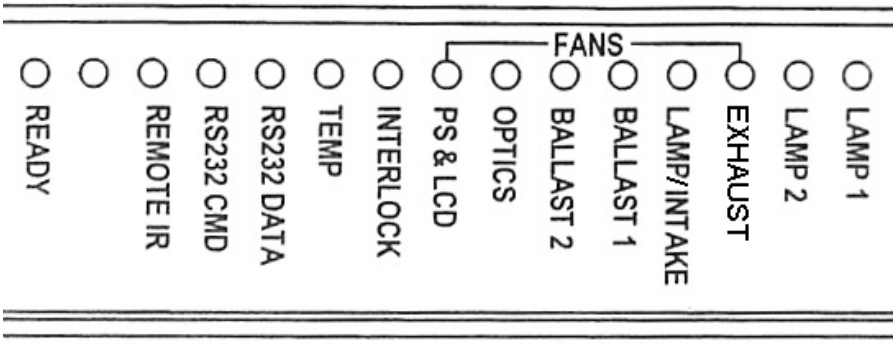
This will turn on the lamps, if they are otherwise capable of being turned on. This will not work, of course, if the problem is that the 350 volts is missing, or both lamps have failed.

⚠ ***WARNING***

This bypass state remains in effect until AC power is cycled. **Be sure to cycle AC power** when you are finished testing.

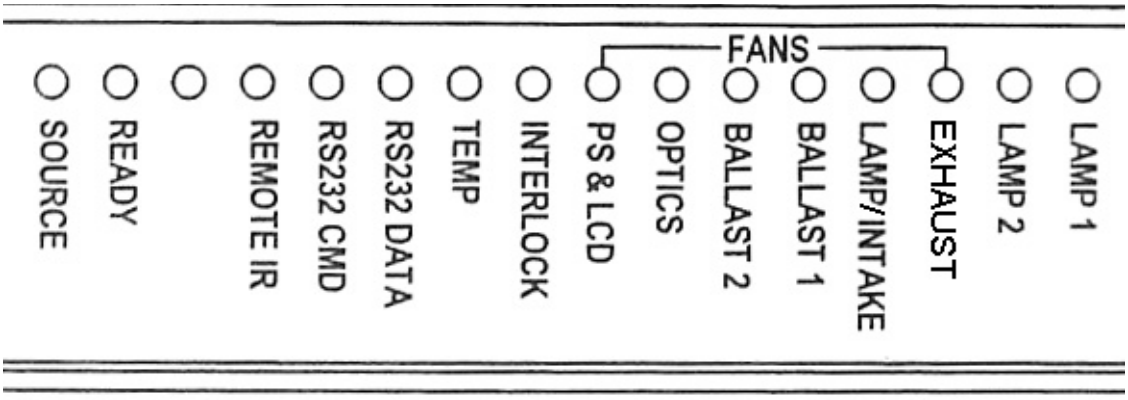
The Meaning of the LEDs

LED Name	When the LED is… Off	Green	Amber	Red
Lamp 1	Lamp off	Lamp on	Lamp striking	Lamp failed
Lamp 2				
Fans: Intake, Lamp/Exhst, Ballast 1, Ballast 2, Optics, PS & LCD	Fan is off	Fan is running	Fan failed recently, but is now running.	Fan failed; lamps disabled
Interlock	No power to electronics	Interlocks closed; lamps enabled	Interlock was open, now closed. Must cycle AC power to reset and enable lamps.	Interlock open; lamps disabled
Temp	No power to electronics	All temps within their ranges	One temperature near its limit	One temperature over its limit
RS232 Data	No command received	Received any command		
RS232 CMD		Received command “meant for me”		
Remote IR	Not receiving IR now	Receiving IR radiation		
(not used)				
Ready	Lamps on, or no power	Ready for On command; lamps enabled	Waiting for lamps to cool	Lockout; must cycle AC power to reset
Source	No power to electronics	Selected source is valid		Source absent or selected source not valid

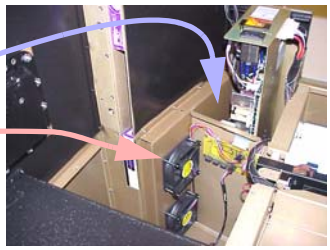


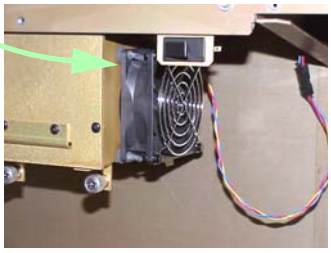
2.4.3 Which Fan Failed?

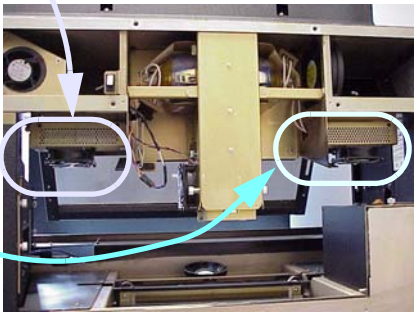
There are 11 fans but only 6 fan indicator LEDs.

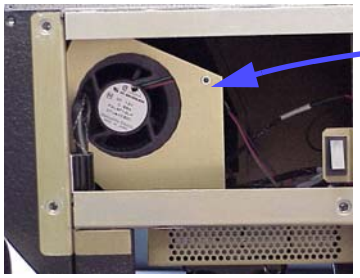


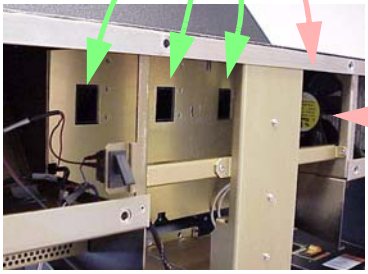
Fan LED	Where the fans are
PS & LCD (3 fans)	1 fan on power supply 2 fans on LCD
Optics	1 fan on Light Tower below Lamp 2
Ballast 2	Below Ballast 2
Ballast 1	Below Ballast 1
Lamp/Intake (4 fans)	1 intake fan across lamps 3 lamp fans behind lamps
Exhaust	1 fan blows up exhaust chimney







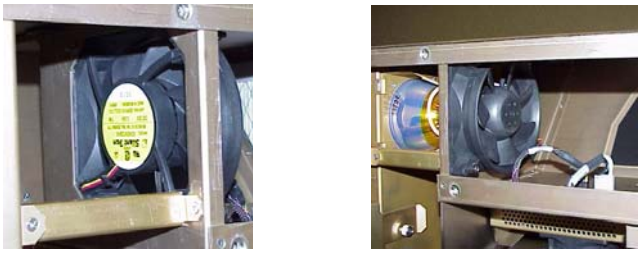




Intake and Lamp fans

When one of these four fans fails, how can you tell which one?

1. Turn off the AC power.
2. Remove the two lamp cables, the cables from the ballasts.
3. Working from the front, remove the light shield. Working from the rear, remove the rear panel.
4. Turn on the AC power. It is not necessary to bypass the interlock you opened.
5. Observe the Intake fan.

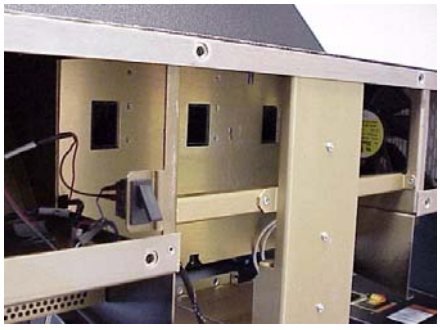


Two views of Intake Fan from the Rear

6. Turn on AC power. All fans will try to start within a few seconds. Is the Intake Fan running?

If the Intake Fan is running normally after the test above, then:

1. Turn off the AC power.
2. Lower the light tower.
3. Keep the lamps disconnected.
4. Turn on the AC power. You can now observe the three Lamp Fans. You may need a flashlight to see them clearly.



2.5 Fixing Image Problems

If the lamps light and there is no picture, or the picture is incorrect, start here.

Screen is white

When the screen is all white, press MENU or MONITOR to turn on a menu. If you *do not* see a menu, check the LCD cable on top of the electronics module. It is probably not connected. If it is connected here, it may not be connected at the LCD end.

If you *can* see a menu, there are other reasons for a white screen:

- White test pattern is on.
- Curtain is on, and Curtain is set to white.
- Source is a white screen.

Screen is black

Check the tables on page 20.

Black line at edge of screen

If you see black at the edge of the screen, or on the top or bottom, try moving the picture with the remote (MENU > **Size & Position** > **Picture Position**). If this does not make the picture cover the black area—if the picture seems to disappear into the black—it means the LCD is not aligned properly.

1. Press menu.
2. Select Advanced Options and press enter.
3. Select LCD Alignment.
4. Select Test Pattern and use the +/– keys to select Grid or Alignment.

Use the test pattern to align the LCD to the screen. The Grid pattern is good for general alignment. The Alignment pattern will show you exactly how many pixels are hidden behind the mullions (the metal edge of the screen).

Use the up-down arrows to select the edge you want to move. Use the +/– keys to make it move.

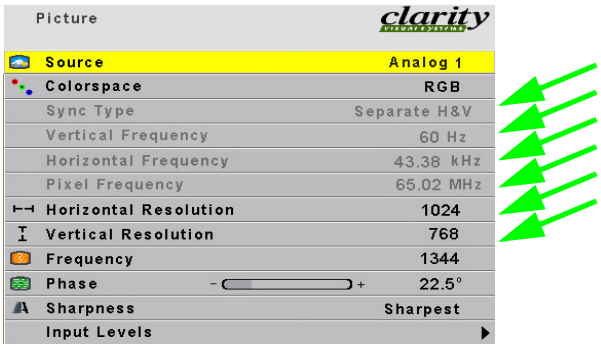
- The Left Edge and Right Edge controls move the LCD image up and down on the two sides. These can also rotate the image slightly when used separately.
- The Horizontal control moves the image left and right, but it may also raise and lower the image slightly.

See also "Aligning the LCD, an Important Step" on page 40 in the Puma User Guide.

✎ If the LCD Alignment tool will not move the LCD enough, this may mean some optical part is very far out of alignment or is broken.

Picture is distorted, noisy

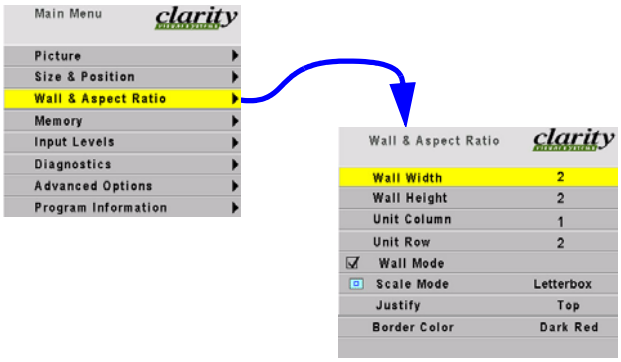
Is the resolution of the source the same as shown in the **Picture** menu? Does this data match what you *know* the source picture is?



Picture is stretched or chopped off

The picture might be stretched or cut off on one or two sides if the aspect ratio of the source picture does not match the aspect ratio of the Puma.

The Puma's aspect ratio of 1.33 (4×3). If the picture is SXGA (1.25) or HDTV (1.77) or a source with some other aspect ratio, check the Aspect Ratio menu.



Look at **Scale Mode**. If this is Fill All, there may be distortion. If it is Crop, some parts of the picture may be chopped off. If it is Letterbox or Wide Screen, there may be a solid color filling the top or bottom or both.

If the aspect ratio of the source is 1.33, these settings will all produce the same picture.

Picture is keystoned

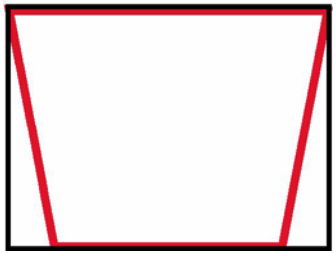
If the picture is wider or narrower at the top than at the bottom, go to "Adjusting for Keystone" on page 30.

2.5.1 Adjusting for Keystone

Keystoned pictures are wider at the top or wider at the bottom.

About keystone

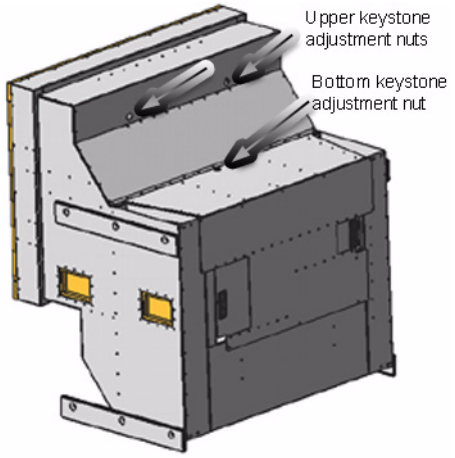
A keystoned picture is one in which the width of the top of the picture is different from the width of the bottom of the picture. We'll call the "vertical keystoning." In this example, the top of the picture is wider than the bottom.



Horizontal keystoning, in which the sides of the picture are different heights, is very uncommon.

When to check keystoning

For Puma, you can only adjust keystoning when you have access to the entire rear of the display.There are two opportunities to check keystone *before* the wall is completed.



1. **Before the display is installed in a wall**, hang a screen on it, connect power, and check the keystone with either the Grid pattern or the Alignment Dashes pattern. See the section in the User Guide about installing and removing a screen.
   a. The shoulder nuts do not have to be tightened. Just let the screen hang on its bolts.
   b. Close the screen all the way, whether the screen brackets with their guide pins are installed or not.
   c. Check for keystoning and adjust if necessary. Remove the screen when finished.
2. **After one row of a wall is buil**t, install one screen on one display and check keystoning.
   a. The shoulder nuts do not have to be tightened. Just let the screen hang on its bolts.
   b. Close the screen all the way, whether all screen brackets with their guide pins are installed or not.
   c. Check for keystoning and adjust if necessary. Move the screen to the next display and repeat.

How to test for keystoning

Open the LCD Alignment menu or the Test Pattern menu. Choose the Grid pattern. If the keystone problem is large, you will see it with this pattern.

For more a more exact test, use the Alignment Dashes pattern. This pattern has six dashes at the very edge of all four sides. The dashes are on the last six pixels of the LCD, so they represent the absolute edge of the picture.

Count the number of dashes you see top of the left and right sides. Then look at the bottom of the left and right sides. Are these the same?

You can adjust the LCD for vertical and horizontal position and for rotation with the LCD Alignment menu. Try that first.

If the picture is still keystoned, you will have to make a mechanical adjustment.

Adjusting keystone in Puma

3. Go to the back of the Puma. If there are other displays on top of this one in a wall, you will have to disassemble the wall to get to the adjustment.

4. Adjust the *lower* nut.
   a. To increase the width of the bottom relative to the top, tighten the nut.
   b. To decrease the width of the bottom relative to the top, loosen the nut.
   c. If you cannot tighten the lower nut enough, you can loosen *both upper nuts the same amount*. This will *decrease* the width of the top relative to the bottom.
5. Check the results frequently from the front.
6. After the pattern is square (rectangular), adjust the pattern's position and rotation with the LCD Alignment menu.

2.6 Mechanical Problems with Walls

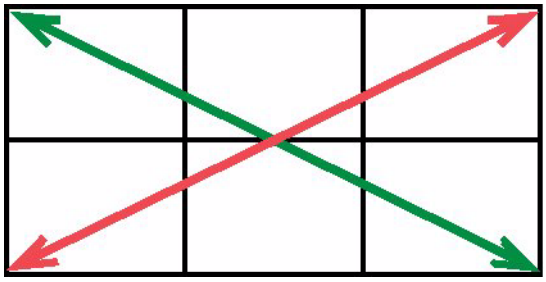
If things don't fit right mechanically, the problem is in the original wall setup.

Screen fit problems #1

The screens should slide in and out easily. It should be easy to latch them in place by pressing with the heel of your hand on each of the four corners. Sometimes it helps to lift the screen slightly as you press in on the corners.

If screens do not go back into place easily, it may be that the original build was not done well. This can be difficult to fix after the wall is complete.

To test whether the wall is well constructed, measure the wall diagonally from one corner of an outside screen to the opposite corner. If these two measure-



ments are *not* the same, the Puma wall is *not* rectangular.

The most likely cause of a non-rectangular wall is that the first row of Pumas was not laid straight originally. Perhaps the floor or platform was not straight, and no shims were used to compensate for this.

Screen fit problem #2

If the distance between adjacent screens changes when they reach their fullest extent., the wall is not straight.

3 Replacing Parts

3.1 Where Everything Is … 34

3.2 Opening and Closing the Screen … 40

3.2.1 Removing the Screen … 42

3.3 Removing the Rear Panel … 44

3.4 Lowering the Light Tower … 46

3.4.1 Removing the Light Tower … 48

3.5 Electronics Module … 50

3.6 Power Supply … 52

3.7 Lamp Ballasts … 54

3.8 Fan: Lamp and Intake … 56

3.9 Fan: Exhaust … 58

3.10 Fan: Optics (PBS Cooling Fan) … 60

3.11 Fan: LCD and Power Supply … 62

3.12 Fan: Ballast … 64

3.13 Temperature Sensors … 66

3.1 Where Everything Is

The next several pages shows where all the parts are.

Front or rear service?
While it is true that all service can be done from the front or the rear, some procedures are easier from front, some from the rear. When one is easier, this manual will note that.

In some procedures separate instructions are given for working from the front and from the rear. In others, separate pictures are used, some taken from the front, some from the rear.

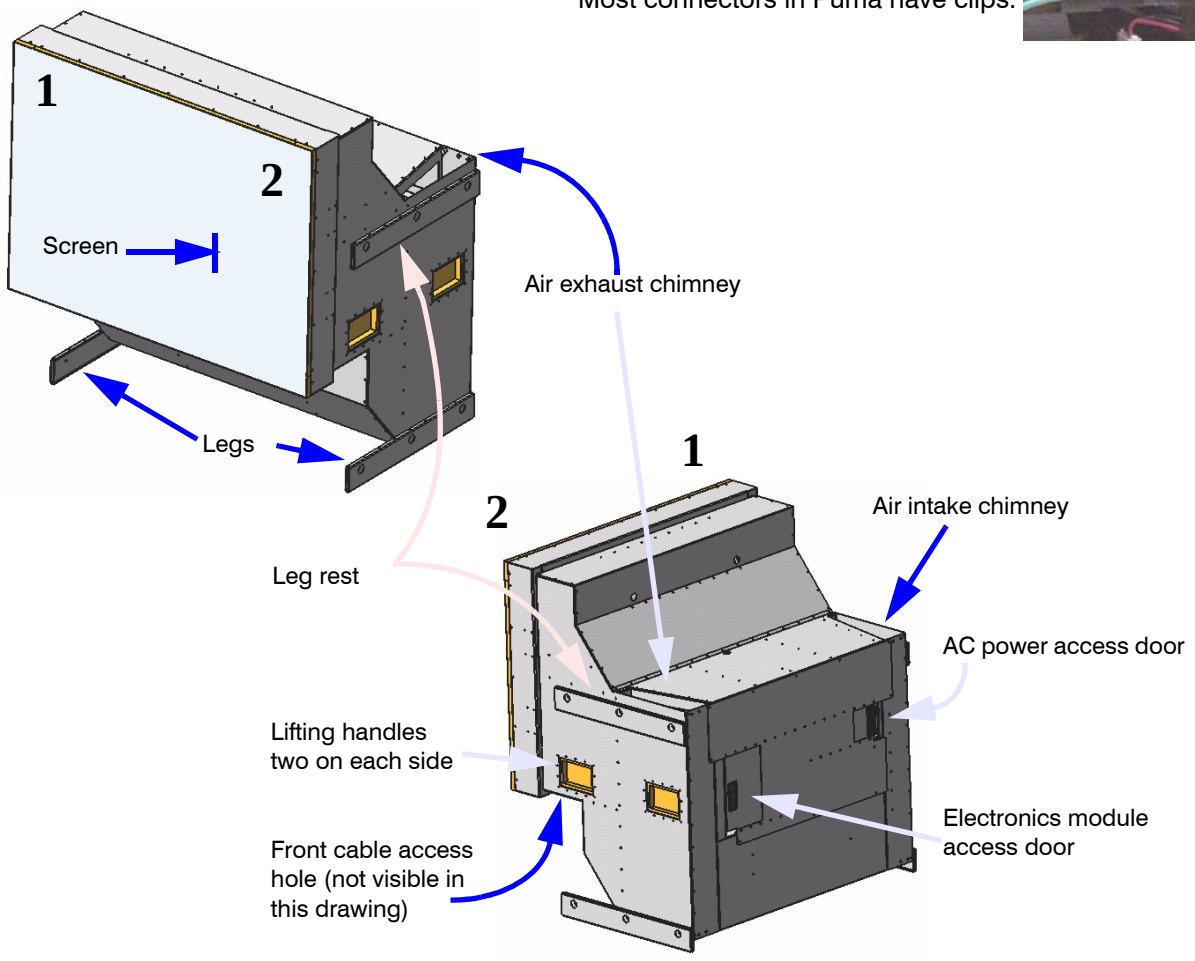
In many instances, you will have to work partially blind: The screw you have to loosen is visible from the front, but you are working from the rear,. The pictures try show parts from the point that most clearly shows where they are and how they are installed.

Left or Right?

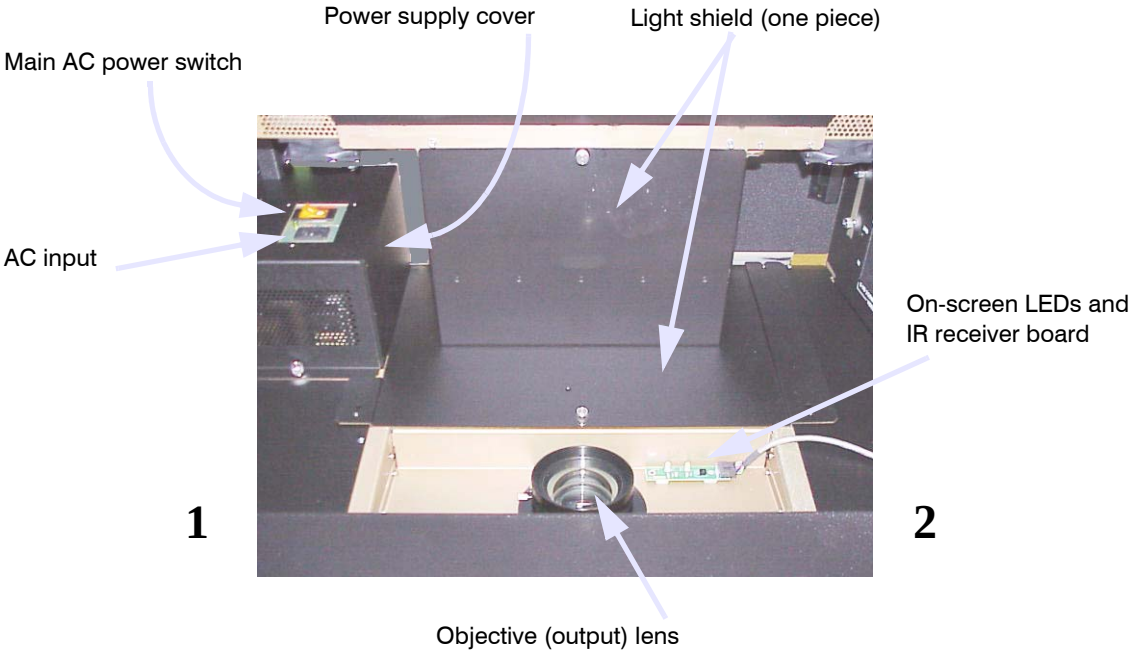
Because you can work from front or rear, the terms "left" and "right" become confusing. So, in many places in this manual the sides are referred to as Side 1 and Side 2. Side 1 **is on the left as you look at Puma from the front.** Lamp 1 and its ballast are on Side 1

Exterior parts

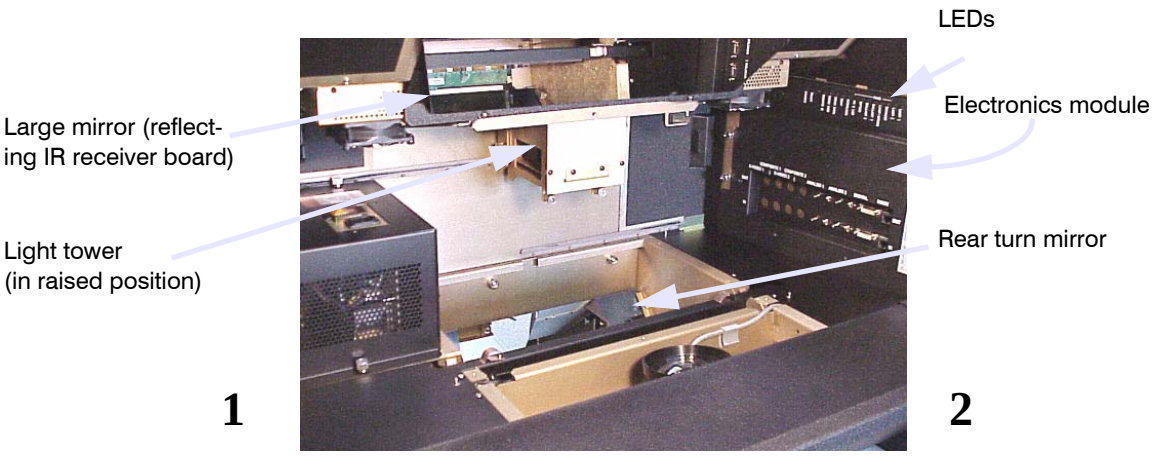
CAUTION
Most connectors in Puma have clips.



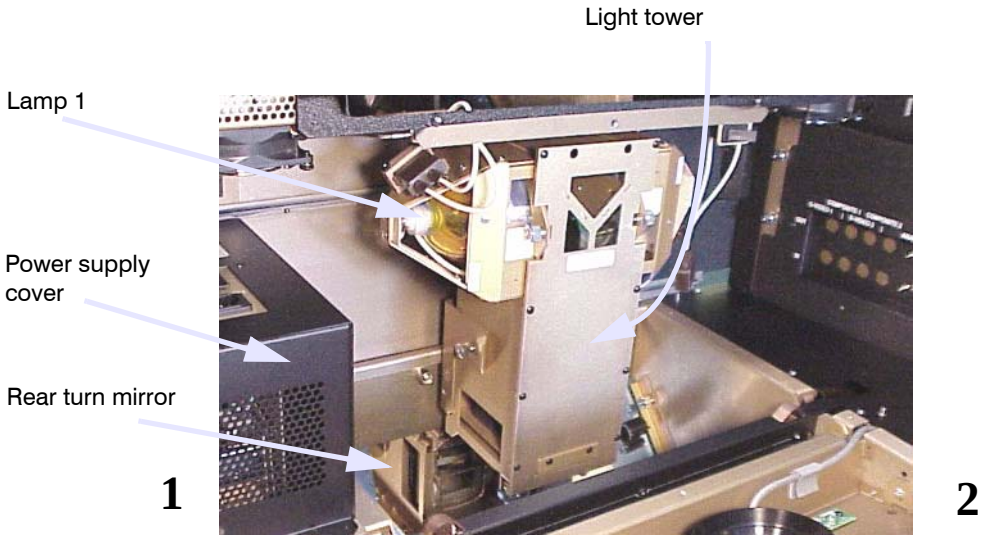
Interior, light shield on, front view



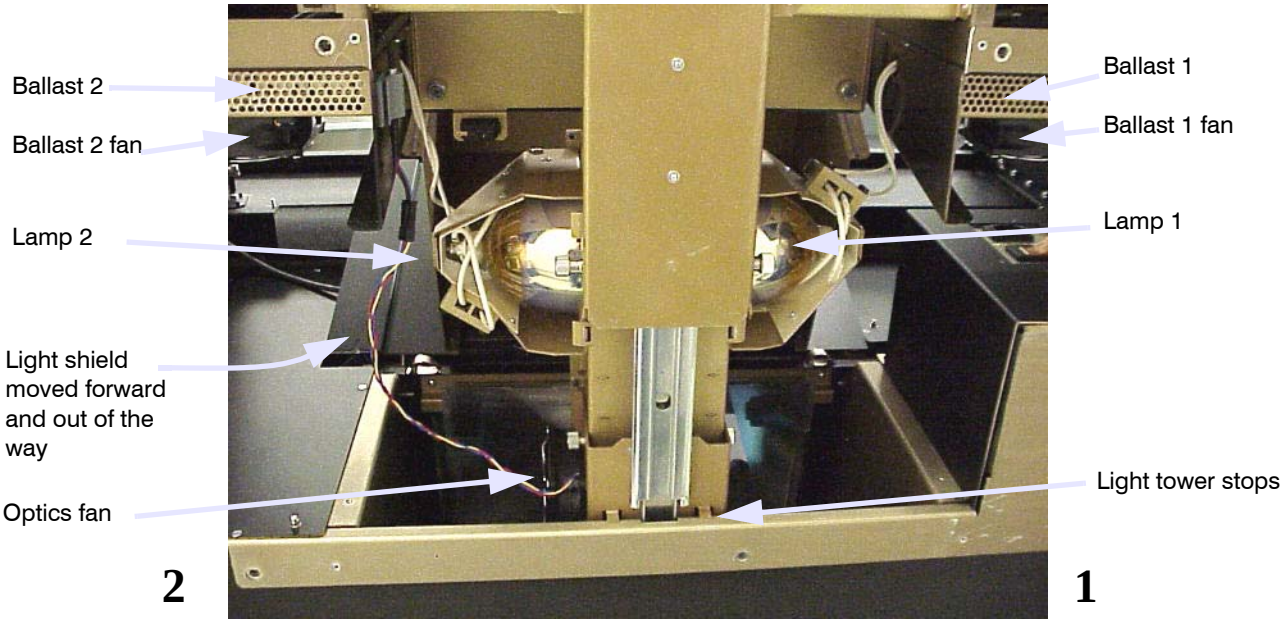
Interior, light shield off, front view



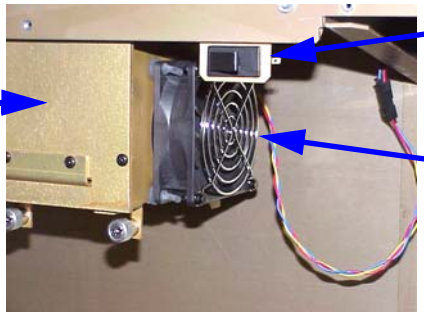
Light tower, lower, front view



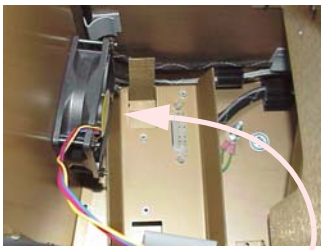
Light tower, lowered, rear view



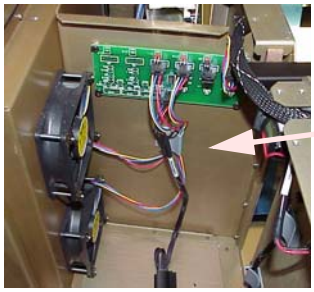
Light tower, raised, front view

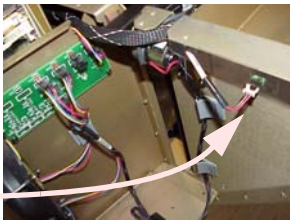


LCD & PS fans, board, front view

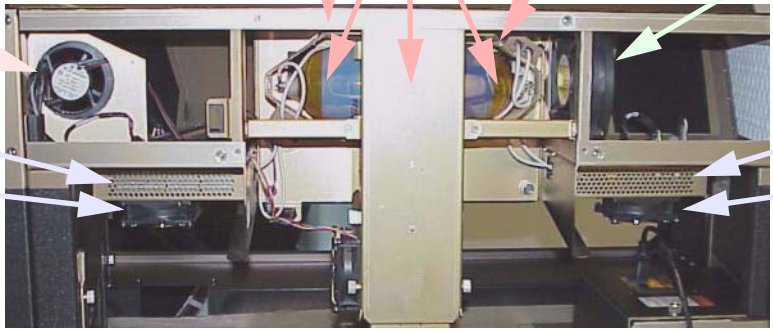

The power supply fan …
… is behind this wall.

Below this cover …

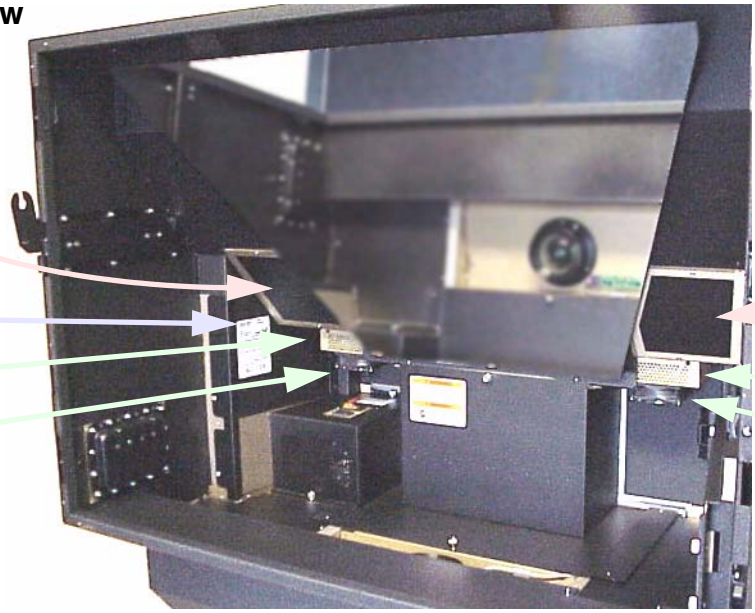

… you see the LCD fans and the fan board.


Intake air temperature sensor

Ballasts, rear view



Ballasts, front view



3.2 Opening and Closing the Screen

You can latch the screen open to work from the front. There are two types of screens for Puma, glass (the most common) and acylic.

To open a glass screen

✎ If the wall is tilted, you may have to loosen the retaining screws from the inside.

1. Press a suction cup at one corner of the screen.
2. Pull out sharply about ½" (12 mm). The screen will pop out at this corner. Do this at all four corners. To release the suction cup, pinch the two rubber posts together.
3. Pull the screen straight out all the way to the end of its travel on the screen slides. (These are like filing cabinet drawer slides.)
4. If you want to work from inside: Pull out the bottom of the screen until it tilts about 45°.
5. Move the screen props up until they are horizontal, as shown below. Do this on both sides.
6. Let the bottom of the screen down to rest on the props.

To open an acrylic screen

⚠ ***WARNING***

Do not use a suction cup with acrylic screens. You could damage the screen.

Screens are opened with a "pusher" just enough to release the spring latch. The pusher is operated with a 5/16" nut driver or socket wrench.

Turn the nut driver in the direction of the arrow. There are nuts on all four corners of the screen, but you only need to do the two sides. Use either the top or bottom nut to release both spring latches on that side.

✎ Before you push the screen back on, turn the "pushers" back to their recessed position so the screen can latch.

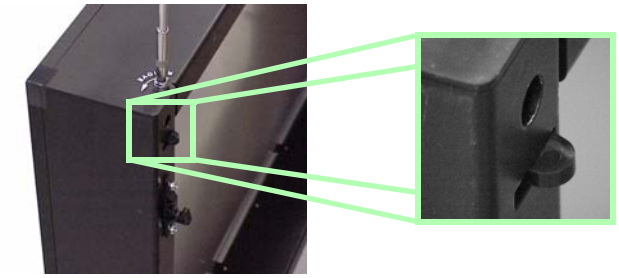
To close the screen

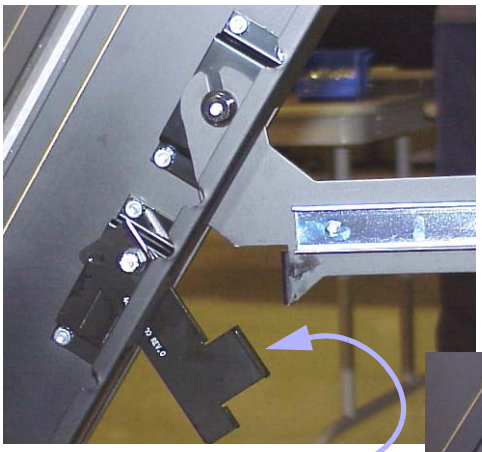
1. Slide the screen in against the Puma. Slide it evenly so both side go in at the same time.
2. When the screen is touching the Puma frame, place the heel (ham) of your hand it each corner of the screen and press in sharply. The screen will snap into place at each corner.

⚠ ***CAUTION***

If the screen will not go in and latch properly, check that the screen brackets are in the correct positions. A bracket in the wrong corner will not let the screen in. Forcing it may break the glass.

Acrylic screen from the rear, **not** installed on a Puma, showing the screen removing mechanism. The screen "pusher" is now recessed. Use a 5/16" nut driver to turn in the direction of the arrow.





Screen prop part way up.

All the way up.

Screen in work position.

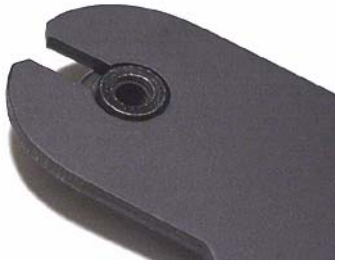
3.2.1 Removing the Screen

This should be done with two persons. The screen is too large and awkward to handle with just one person doing the job.

This is a two-person job.

7. Open the screen and pull it all the way out. Do *not* tilt it. Let it hang vertically.
8. Loosen, but do not remove, the nut that holds it to the sliding arm. The nut is on the inside of the

screen. Do this on both sides. The nut has a shoulder that fits into the slide arm. You must loosen it enough so the shoulder is



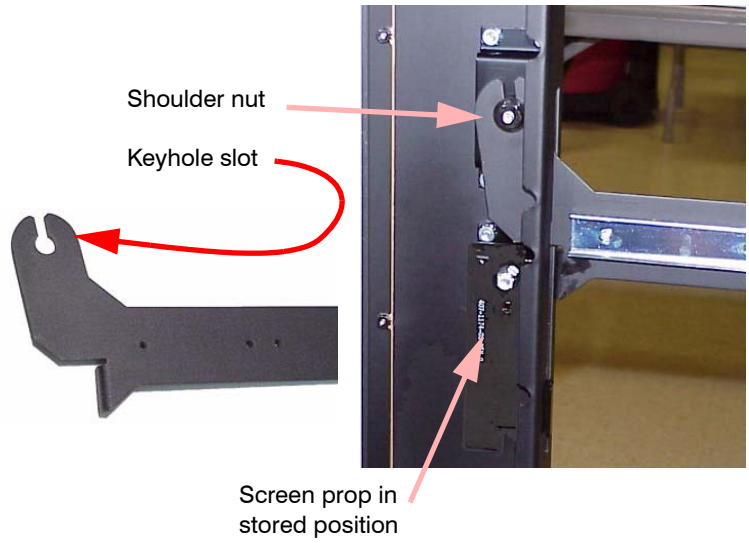
Shoulder on nut as seen from the slider side.

Shoulder on nut as seen from the outside.

9. When both nuts are loose and with one person on each side of the screen, tilt it out at the bottom until the screen is at about 30°. Then lift it up and off.

⚠ *CAUTION*

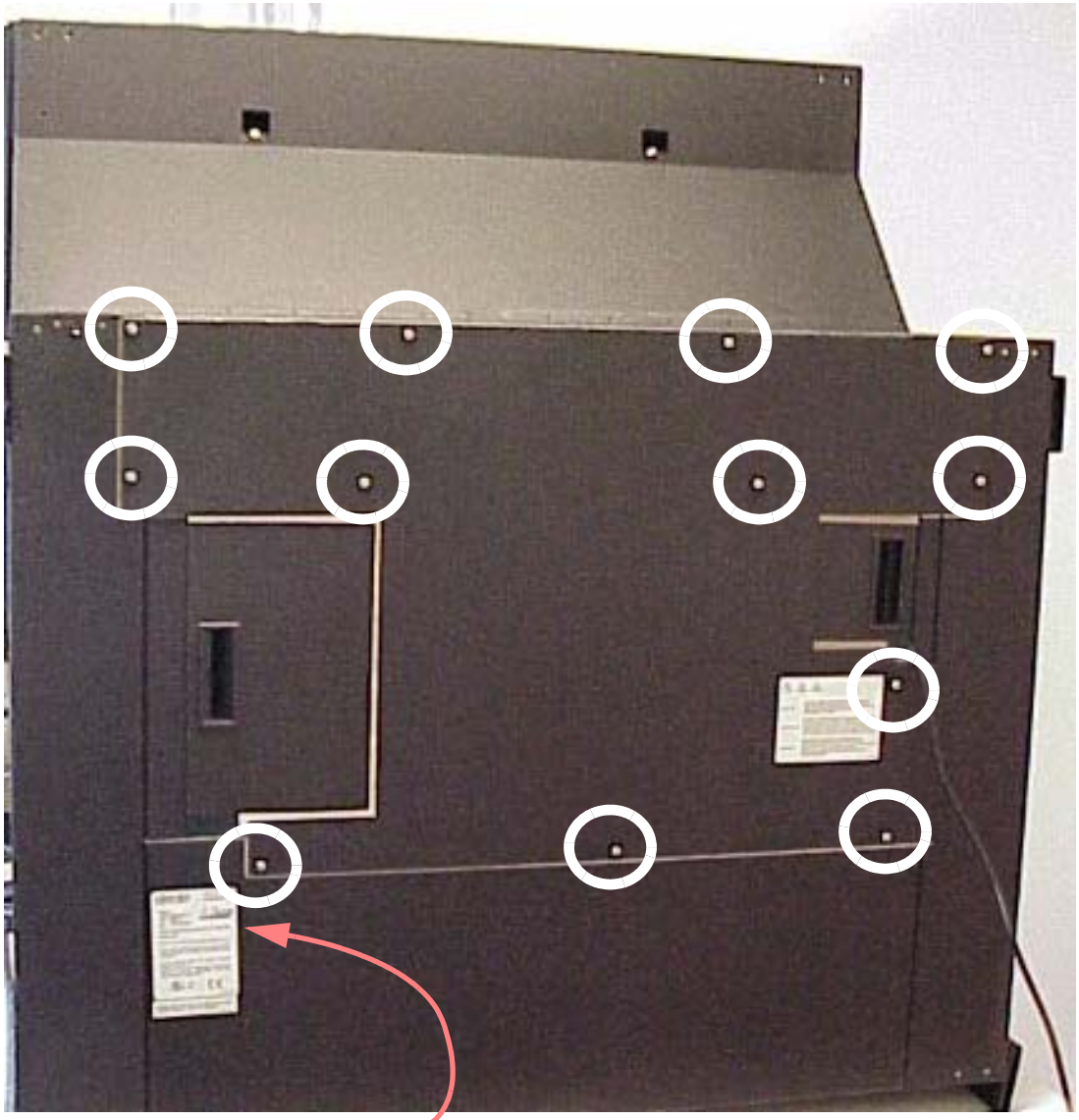
When setting the screen down, be careful to set down the whole bottom edge. Setting the screen on one corner may cause the screen frame to warp and the screen glass to crack.


Shoulder nut
Keyhole slot
Screen prop in
stored position

3.3 Removing the Rear Panel

The rear panel has two sliding doors for cable access. You can remove the whole rear panel and perform all service from the rear.

1. If the lamps are lit, turn them off and wait about a minute until the fans stop.
2. Turn off the AC power switch and remove the power cord. It is not necessary to remove input and output cables.
3. Loosen 12 ¼-turn screws, and remove the panel. The two sliding doors come with it.



Serial number is on this label.

3.4 Lowering the Light Tower

You must lower the light tower to change lamps. There are separate instructions for front and rear.

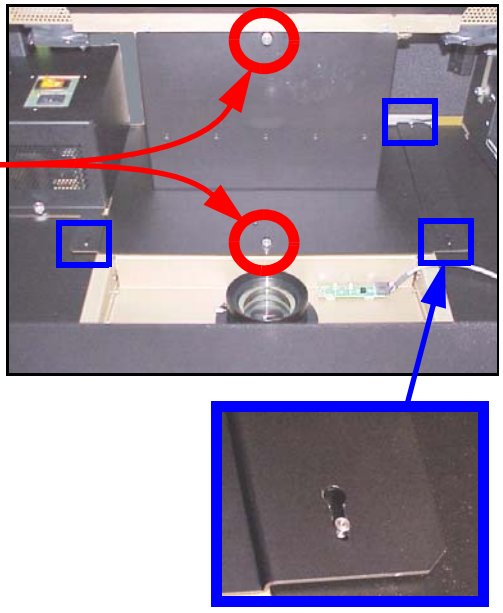
From the front

1. Remove the power cord.

> ***WARNING***
> If the AC cord is connected and the switch is on and the interlocks are bypassed, the lamp terminals carry a voltage.

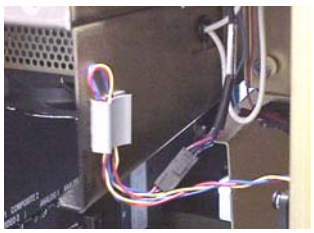
2. With the screen open in work position, remove the **light shield**.
   a) Loosen two screws, top and bottom center on the light shield.
   b) Pull the light shield forward and out. There are three keyhole slots (in the squares above) that hold the edges down.

Light shield screws



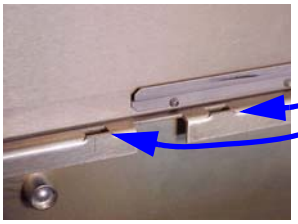
3. Release the optics fan cable from its clamp so the light tower can go down.

View from rear



4. Loosen the two light tower screws.

5. Pull down on the light tower to release it from spring catches that still hold it up. *Lower it slowly.*
6. Near the bottom, be sure the hooks on the rear of the light tower catch the holes on the back rail. If the hooks do not go into the holes, the light tower may go even lower and damage the rear turn mirror below it.



Holes in back rail

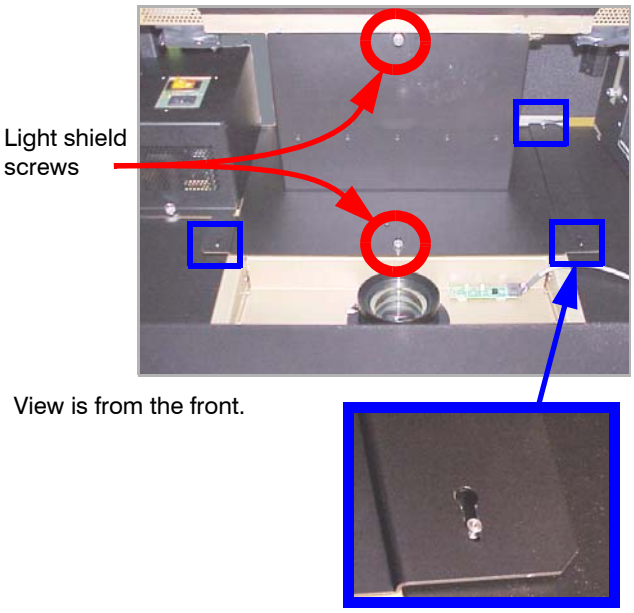
View from rear: Hooks on light tower going into holes.

From the rear

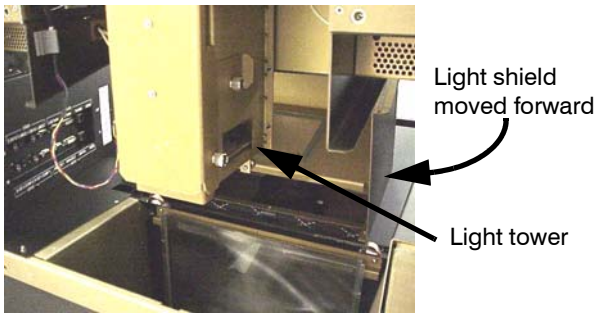
1. Remove the power cord.

> ***WARNING***
> If the AC cord is connected and the switch is on and the interlocks are bypassed, the lamp terminals carry a voltage.

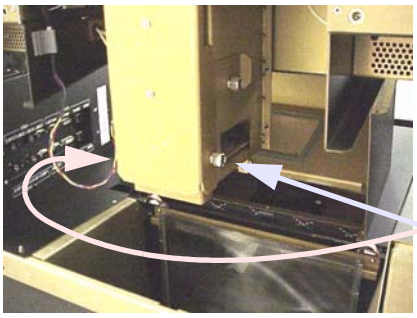
2. Remove the rear panel ("Removing the Rear Panel" on page 44)
3. Loosen the two screws on the light shield. You can't see these screws from the rear; you will have to feel for them. If these screws and more than finger-tight, you can use a Philips or flat-blade screwdriver.



4. Push the light shield forward. Lift it up and set in close to the back of the screen.



5. Loosen the two screws near the back of the light tower.

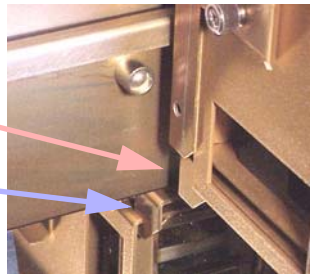


6. Pull down on the light tower to release it from spring catches that still hold it up. *Lower it slowly.*
7. Near the bottom, be sure the hooks on the rear of the light tower catch the holes on the back rail. If the hooks do not go into the holes, the light tower may go even lower and damage the rear turn mirror below it.

View from rear: Hooks on light tower going into holes.

Light tower at the bottom of its safe travel.

Reflection of light tower in rear turn mirror.



Raising the light tower

- Raise the tower until you hear and feel the spring latches engage.
- Tighten both light tower screws, finger tight. *Always tighten the screws. Do not depend on the latches to hold the tower up, even for a moment.*
- Reconnect the lamp and optical fan cables.
- Put the optical fan cable in its clip.

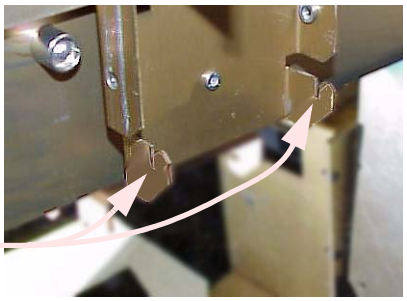
3.4.1 Removing the Light Tower

You must remove the light tower to replace lamp and intake fans or replace the tower.

The light tower rides up and down on a "traveler." It is held onto this traveler by hooks at the bottom of the traveler and by two screws. These hooks are on the *forward* side of the traveler. They are not the same as the hooks on the *rear* that prevent the traveler from touching the rear turn mirror.

Front view

These two slots on the forward side of the bottom of the traveler hold the light tower in place.



Removing the light tower

1. First, lower the light tower, page 46.
2. Disconnect the optics fan cable.

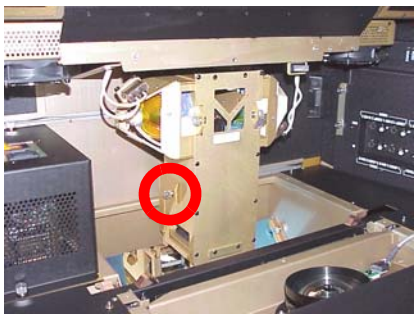
Rear view

Optics fan cable

3. Be sure both lamp cables are disconnected.
4. Loosen the two screws at the sides that hold the light tower onto the vertical traveler.

Front view
Light tower screw on Side 1.

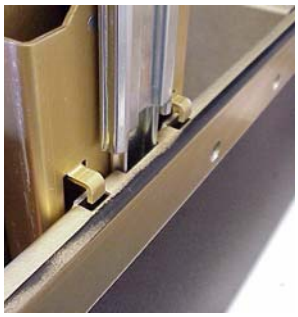
Similar screw on Side 2



5. Tilt the top of the light tower toward the screen and lift it out.

Replacing the light tower

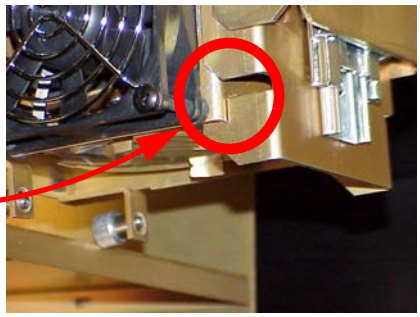
1. Lower the empty traveler to the bottom, and be sure the rear hooks engage the holes in the back rail.



2. Carefully lower the light tower into the forward hooks. Make sure the light tower settles all the way down in these hooks.

Rear view

Light tower must fit all the way into these hooks.

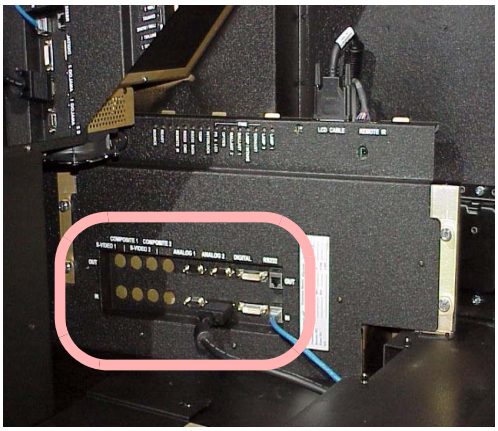


3.5 Electronics Module

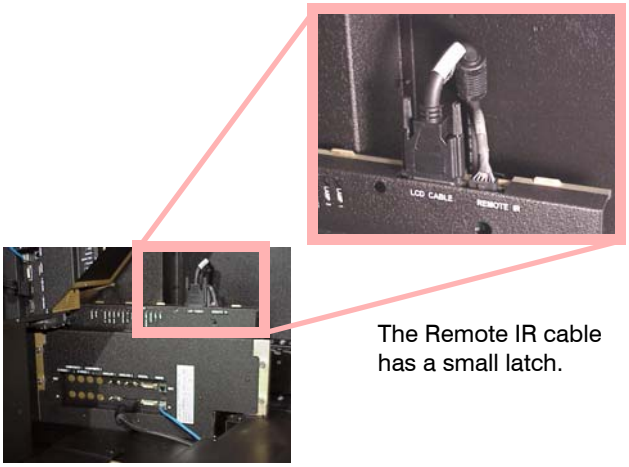
This is a little easier from the front.

Removing, from front or rear

1. Disconnect all input and output cables from the electronics module.



2. Disconnect the LCD and Remote IR cables from the top of the electronics module.



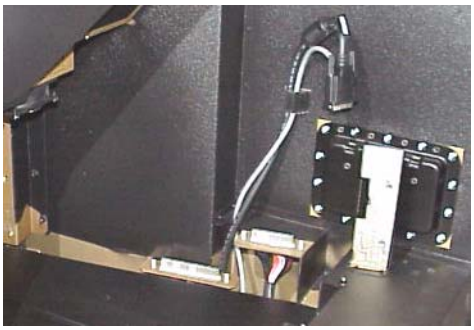
The Remote IR cable has a small latch.

3. Loosen four captive screws.

4. Lift up the electronics module to disconnect it, and take it out.

Electronics module coming of the rear of the Puma.

Module removed, showing connectors.



Installing, from front or rear

Reverse the steps above. Don't forget to:

- reconnect all input and output cables;
- reconnect the LCD and Remote IR cables.

✎ If you see a white screen and you can't display a menu, it means you forgot to connect the LCD cable. If you can't make the remote work, you forgot to connect the Remote IR cable.

The Remote IR cable connects to this small circuit board near the lens: The IR receiver is on this board

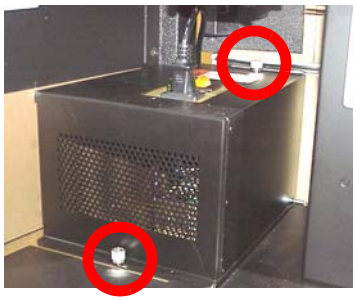
aimed at the large mirror above so it will catch signals from the remote control. The two LEDs on this board are very bright. They flash the On-Screen Code onto the mirror which reflects in to the screen ("Reading the On-Screen Code" on page 14).

3.6 Power Supply

This is a little easier from the front.

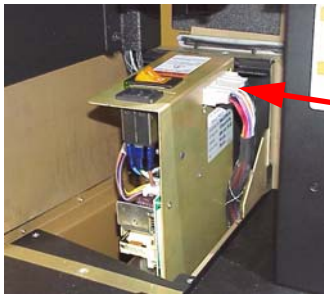
Removing power supply (front or rear)

1. Turn off the power switch and remove the power cord.
2. Loosen two screws are remove the power supply cover.



View from the front.

3. Remove the cable from the side of the power supply.



View from the front.

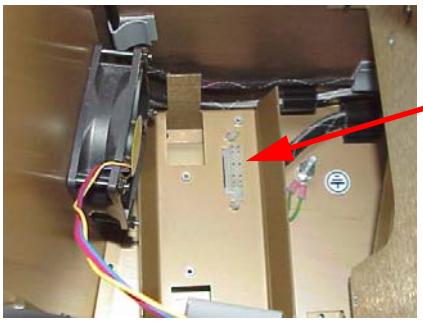
Cable

4. Lift the power supply up as you tilt it forward and away from the center of the Puma.

View from the front.

Installing power supply (front or rear)

1. The power supply has one connector on the bottom and one on the side. They bottom one must mate with the connector shown. There are metal guides to align the power supply with this connector.



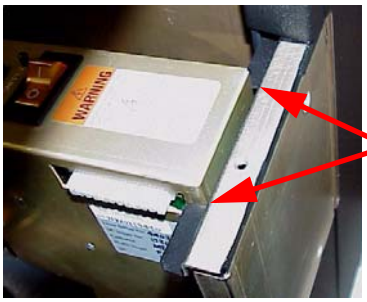
Connector

View from the front.

2. Bring the power supply toward the front and lower backward into its place. Lean it toward Side 1to get it in place.

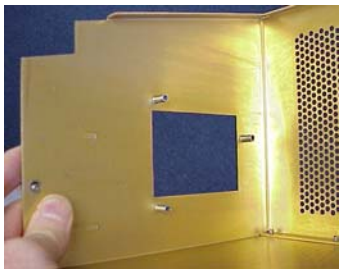
Rear view

3. The power supply should fit into a notch in the back rail.



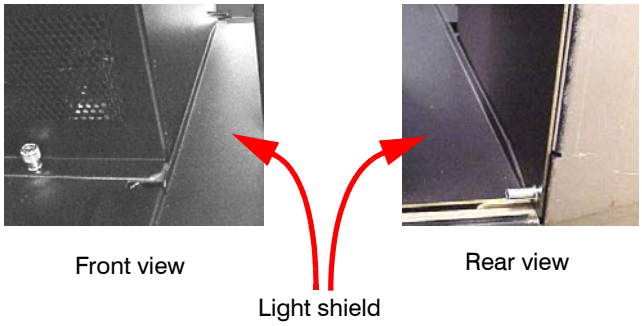
Power supply should fit between these points.

4. The underside of the power supply cover has 3 pins that surround the top of the supply. As you



put the cover on, move the power supply a little to get it to fit between these pins. When it is correct, the cover will be close to the top of the power supply.

5. The cover should fit inside, not over, the flange on the light shield.



6. Tighten the two screws on the power supply cover. Finger tight is enough, unless you are preparing the Puma for shipping.

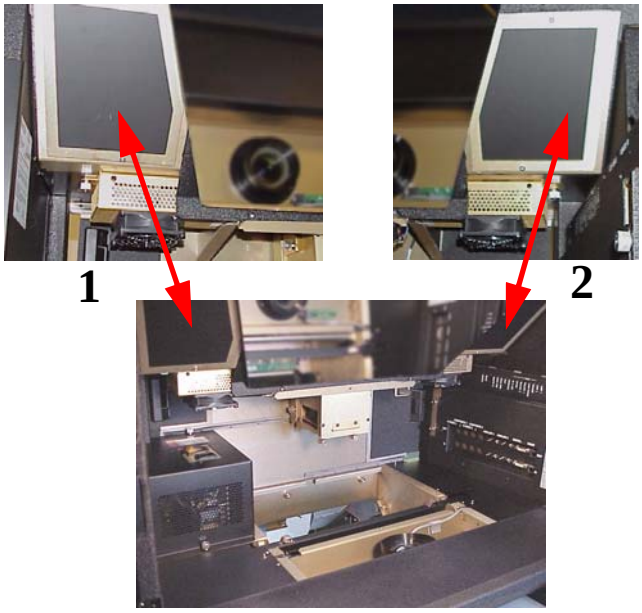
3.7 Lamp Ballasts

This is easier from the rear.

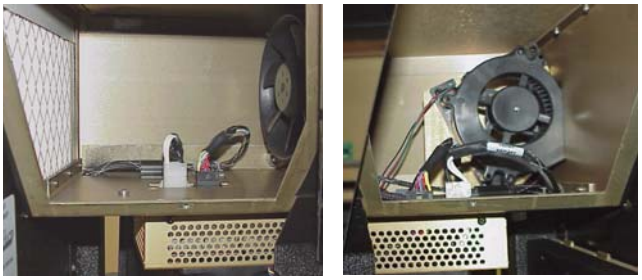
The ballasts are held in place by two tabs fitting into slots and one screw.

Removing from the front

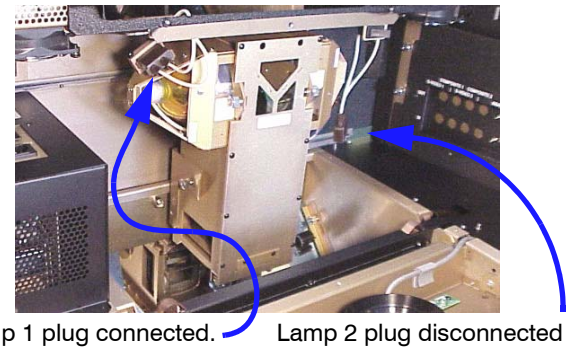
1. Turn off the power and remove the power cord.
2. Remove the panel on the appropriate side of the large mirror. The panel is held by two screws.



3. Disconnect both ballast connectors. The white connector supplies 350V to the ballast. The black connector carries the control and sense lines from the electronics module. Both connectors have small clips.



4. Lower the light tower. (“Lowering the Light Tower” on page 46)
5. Disconnect the appropriate lamp plug.



6. Unscrew the ballast and take it out carefully to avoid damage to the cable.

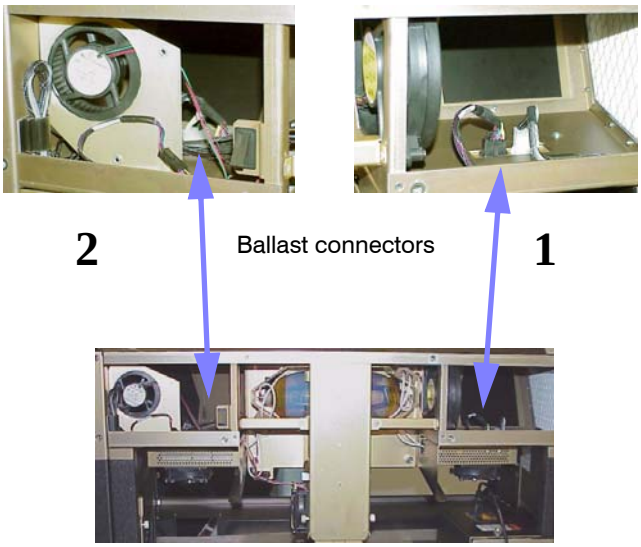
Installing from the Front

In general, reverse the steps above, noting these points:

1. Thread the cable in first, then fit the tabs into the slots and tighten the screw.
2. Raise the light tower.
3. Connect the lamp plug.
4. Connect the two cables at the top of the ballast.
5. Close the panel.

Removing from the Rear

1. Turn off the power and remove the power cord.
2. Disconnect the two cables to the top of the ballast.



3. Remove the ballast plug from the lamp. You can usually do this without lowering the light tower.
4. Loosen the screw on the ballast and take it out.

Installing from the Rear

In general, reverse the steps above, noting these points:

1. Thread the lamp cable in first, then fit the tabs into the slots and tighten the screw.
2. Connect the lamp plug.
3. Connect the two cables at the top of the ballast.

3.8 Fan: Lamp and Intake

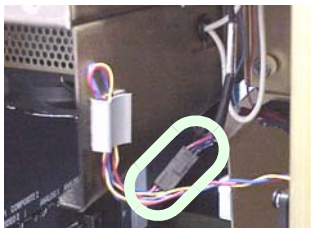
The three lamp fans are mounted on a plate forward of the lamps. These and the intake fan connect to a board on the lamp fan assembly.

Whether you are replacing one of the lamp fans or the intake fan, you must remove the lamp fan assembly. All four fans are plugged into a board that is not accessible until you remove the lamp fan assembly.

Removing the lamp fan assembly

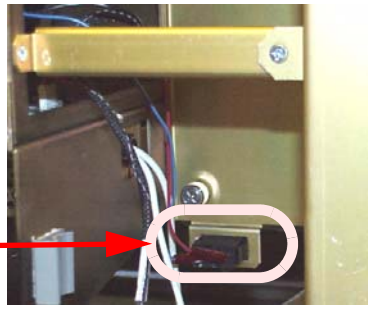
1. Turn off the AC power.
2. Disconnect the lamp plugs.
3. Disconnect the Optics Fan connector and remove the cable from its clip.

Rear view



4. Disconnect the two wires to the light shield interlock switch.

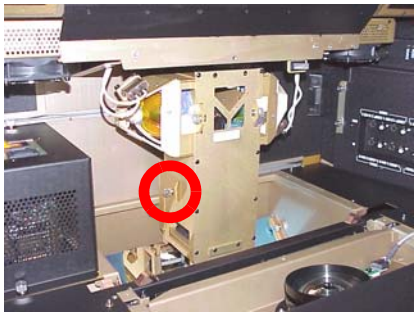
Light shield interlock switch, Rear



5. Lower the light tower.
6. Remove the light tower from the lifting frame.
   a) Loosen the two screws at the sides that hold the light tower onto the vertical traveler.

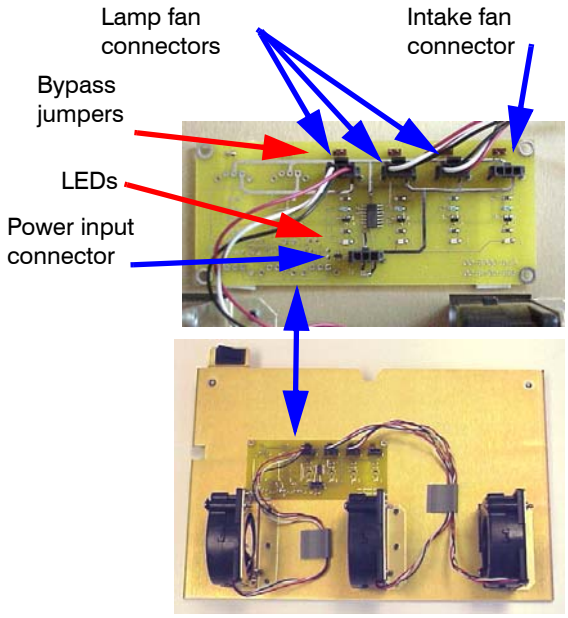
Front view
Light tower screw on Side 1.

Similar screw on Side 2



   b) Tilt the top of the light tower toward the screen and lift it out.
7. Loosen the two screws at the bottom of the lamp fan assembly.

8. Remove the assembly slowly, because it is still connected to the intake fan and a power cable.



Which fan failed?

Each fan is represented by a surface-mount LED on the connection board. After you remove the assembly, you can apply power to the board again through its power connector.

1. Temporarily bypass the interlocks by taping down the switches.
2. Connect the lamp fan assembly board to its power connector (the one you removed to take the board out.

3. Turn on the AC power.
4. The fans will start within a few seconds, and the failed fan's LED will light.

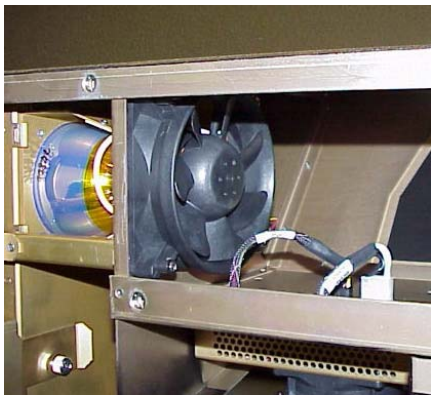
If you have no replacement fan, you can bypass a failed fan by putting a jumper on for that one lamp. This allows the system to light the lamps with a failed fan until you can get a replacement.

WARNING

Bypassing lamp fan monitoring for one lamp is *not* a long-term solution. Get the failed fan replaced as soon as you can. Turn on temperature monitoring while the fan is bypassed.

Replacing the intake fan

To replace the intake fan, you must remove the lamp fan assembly, because the intake fan is connected to the same board. See "Removing the lamp fan assembly" above.



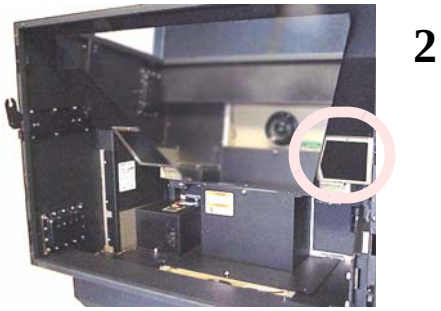
Intake fan seen from Side 1, Rear

3.9 Fan: Exhaust

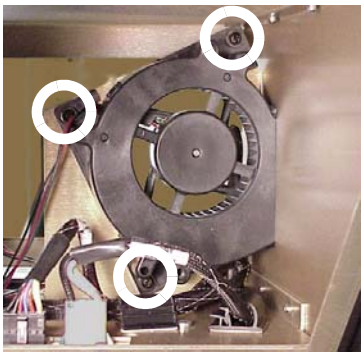
The replacement exhaust fan comes

Removing the exhaust fan, Front

1. Turn off the AC power.
2. Remove the Side 2 access panel.



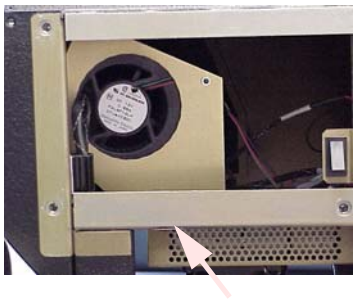
3. Disconnect the exhaust fan cable.
4. Remove the three screws that hold it to the bracket.



View from front

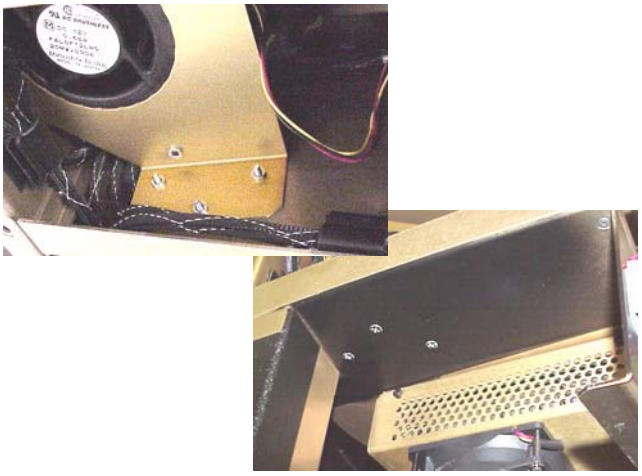
Removing the exhaust fan, Rear

1. Turn off the AC power.
2. Remove the rear panel.
3. Disconnect the exhaust fan cable.
4. Remove the fan bracket and fan.



Remove 3 screws under the exhaust fan bracket.

5. Remove fan from bracket (3 screws from beneath).



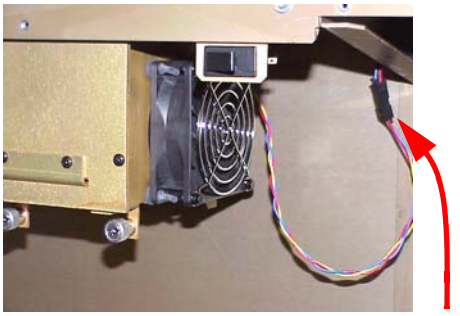
Installing the exhaust fan

Reverse the steps in either procedure. The label of the fan should be to the rear as shown.

3.10 Fan: Optics (PBS Cooling Fan)

The optics fan is held by rubber spacers to prevent the fan from vibrating the light tower.

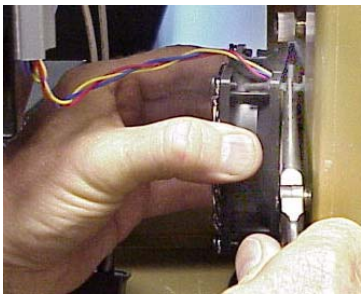
The optics fan is at the bottom of the light tower on Side 2.



Front view Connector

Removing the optics fan

1. Pull out or the side of the optics fan nearest you, whether working from the front or rear.

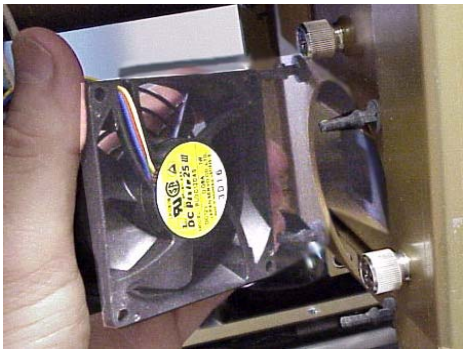


Rear view

2. Grip the rubber spacer between the light tower and the fan with pliers and pull the spacer out of the fan.
3. Repeat at the other three corners.

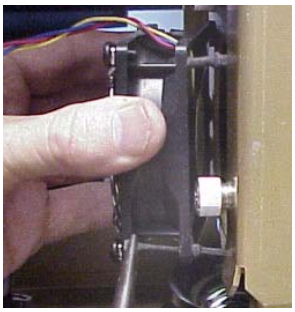
Installing the optics fan.

1. The label on the fan must be toward the light tower so the air blows into the tower.



Rear view

2. At each corner, starting with the corners furthest from you, pull the rubber spacer through the holes until it pops into place.



Rear view

3. Connect the optics fan power cable.

3.11 Fan: LCD and Power Supply

The two LCD fans and the power supply fan connect to a board in the LCD fan area.

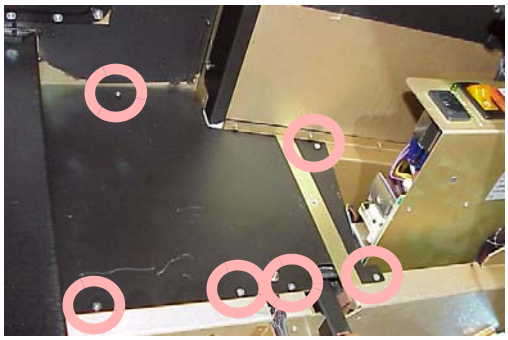
Removing a fan

These three fans are on Side 1 below a cover.

1. Loosen two screws and remove the power supply cover.

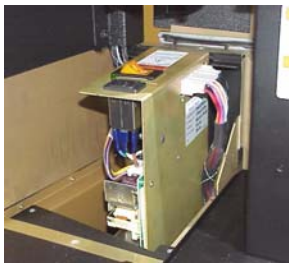
View from the front.

2. Remove the LCD fan cover (6 screws).



If you have to replace the power supply fan, you must remove the power supply. If not, skip to Step 7.

3. To remove the power supply, disconnect the cable on its side.



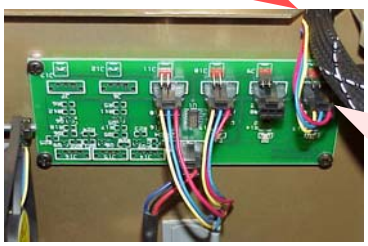
Front views

4. Lift the power supply up and toward Side 1.

Front view

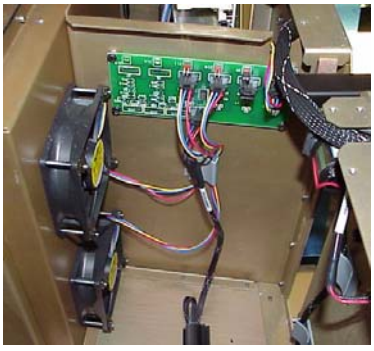
5. Disconnect the power supply fan from the board and remove the four nuts.

Front view



Power supply fan connector

6. Remove the four nuts holding the power supply fan.
7. Disconnect the LCD fan, upper or lower, from the board.



Front view

8. Remove the four nuts holding the fan.

Which fan failed?

Each fan is represented by a surface-mount LED on the connection board. Turn on the AC power. The fans will start within a few seconds, and the failed fan's LED will light.

If you have no replacement fan, you *temporarily* can bypass *one* of the LCD fans fan with a jumper on the pins provided. This allows the system to light the lamps with a failed fan until you can get a replacement.

CAUTION

Do not bypass the power supply fan. The system will overheat and components may be damaged.

It is a good idea to turn on temperature monitoring if you must bypass a fan temporarily.

3.12 Fan: Ballast

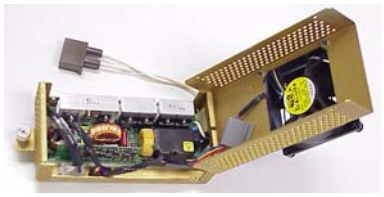
There are two ballast fans, separately sensed and indicated in the LEDs.

When ballasts are replaced, they come with fans. If the fan fails, you can replace the fan alone.

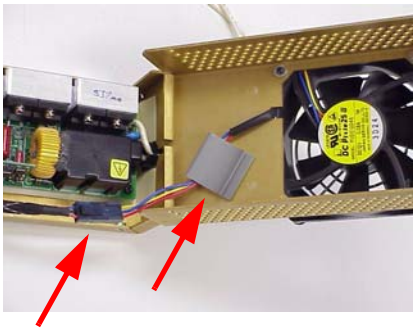
Removing the ballast fan

1. Remove the ballast from the Puma (see "Lamp Ballasts" on page 54).
2. Remove the four screws on the two sides of the ballast.

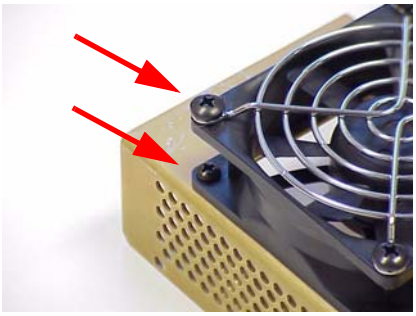
3. Open the ballast slowly. It is connected internally.



4. Disconnect the fan cable.



5. Remove the fan guard and the fan. You will need a small Philips screwdriver, #0, to go through the first hole

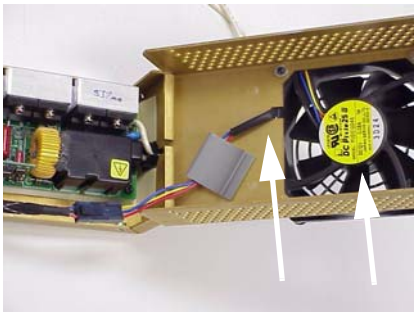


✎ The lower screw has a #2 head, but a #2 or #1 Philips will not go through the upper hole. Use a #0 Philips carefully.

Replacing the ballast fan

Reverse the steps above, noting these points:

- Be sure the heat-shrink tubing protects the fan cable as it goes through the ballast cover.
- The fan's label faces into the ballast.

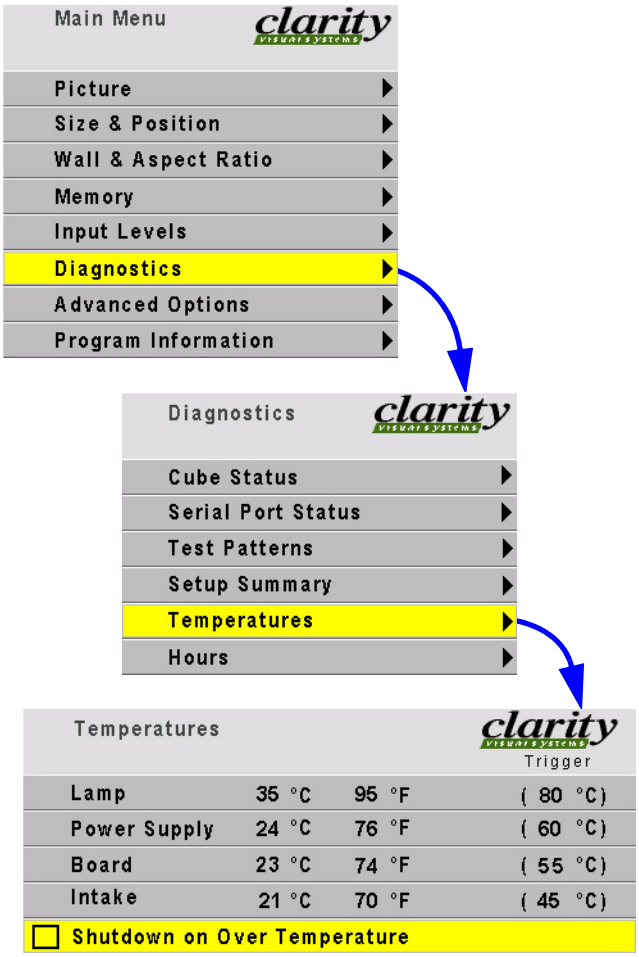


3.13 Temperature Sensors

Two of the four temperature sensors are replaceable in the field—Intake and Lamp

Temperature sensors sometimes fail to give an accurate reading. This can be due to a failure in the sensor itself or in the line communicating with it.

If temperature readings are turning off the lamps, the easiest solution is to turn of temperature monitoring. Un-check the Shutdown on Over Temperature box.

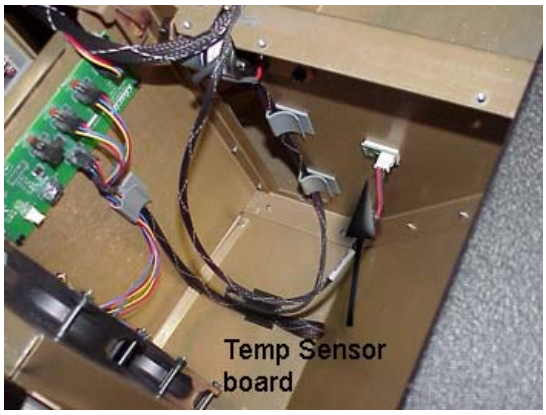


You should continue to monitor the temperature from time to time, manually. Clarity's WallNet™ monitoring device can be set to send an email when temperatures are over a point that you set.

Intake temperature sensor

This sensor is located below the lower panel on Side 1. It is easier to get to from the front.

1. Remove the power supply cover.
2. Remove the lower cover plate.

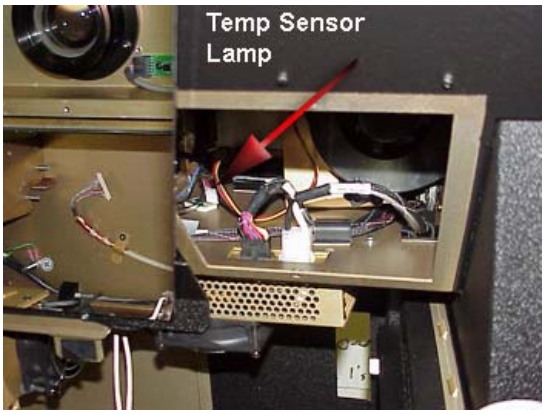


Lamp temperature sensor

This sensor is located near the exhaust fan. It is easier to get to from the rear, but the illustrations show access from the front.

1. Remove the upper cover on Side 2.

2. The Lamp temperature sensor is located in this area.



4 Service for Optical Engine

4.1 Removing the Rear Turn Mirror … 70

4.1.1 Removing the LCD … 72

4.1.2 Removing the Output Fresnel … 74

4.1 Removing the Rear Turn Mirror

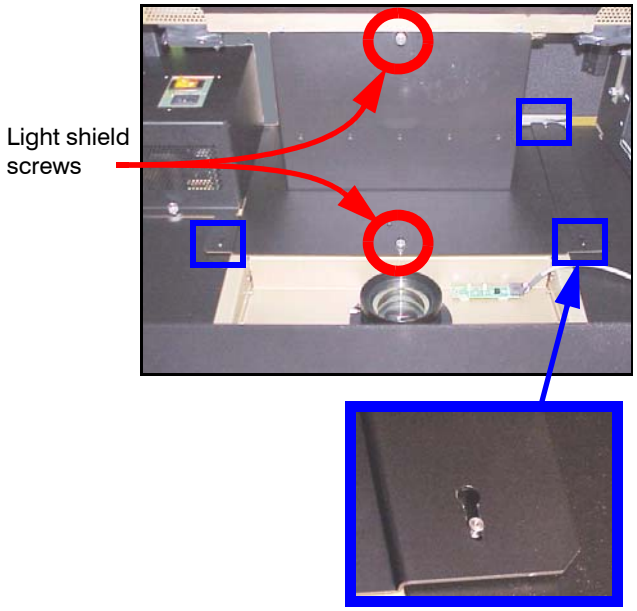
The rear turn mirror is just below the light tower.

There are two cable clamps on the sides of the rear turn mirror. These are used as handles to lift the mirror.

Removing the mirror

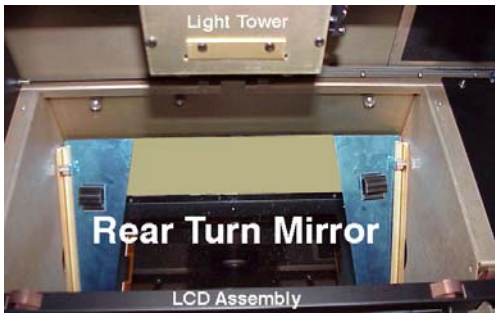
The light tower must be in the raised position or removed.

1. With the screen open in work position, remove the **light shield**.
   a) Loosen two screws, top and bottom center on the light shield.
   b) Pull the light shield forward and out. There are three keyhole slots (in the squares above) that hold the edges down.

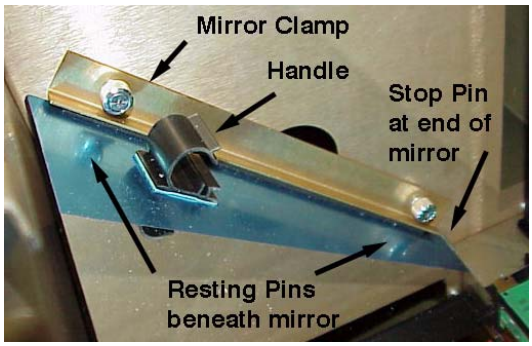


2. Remove the clamps at each side of the rear turn mirror.The Mirror Clamps are screwed to the walls of the optical engine compartment. They may be partly stuck to the mirror.

Rear turn mirror seen from the front



Rear turn mirror clamp, one on each side.



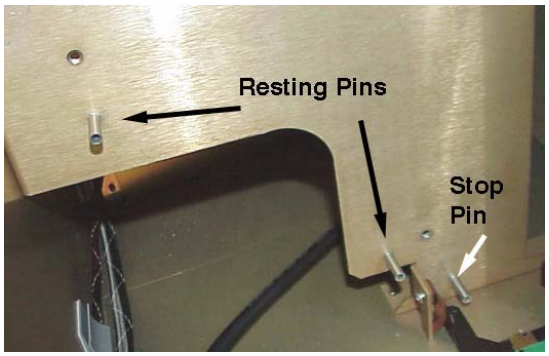
3. Lift the mirror up and out with the handles.

Reinstalling the rear turn mirror

It is very important to place the mirror so it rests on the pins properly and reflects light in the correct direction.

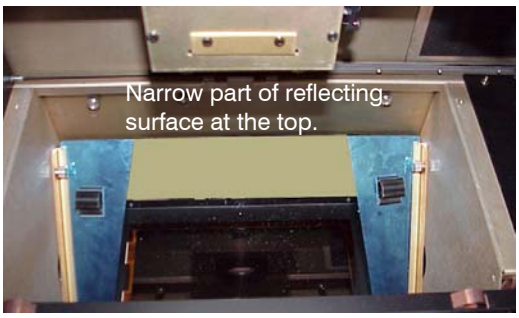
✎ The LCD and other optical parts should be in place **before** the rear turn mirror is installed.

✎ The rear turn mirror rests on two of the three pins on each side. The mirror should *not* rest on top of the Stop Pin, and it should *not* go beneath the Stop Pin.

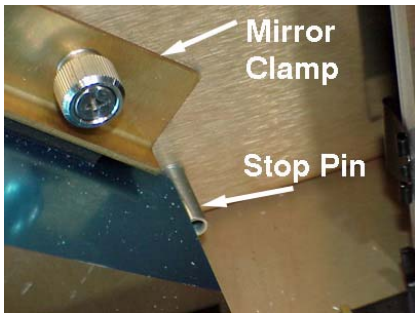


1. Place the rear turn mirror on the resting pins so that the *narrow* reflecting edge is at the *top*.

Rear turn mirror seen from front.



✎ Note that the bottom edge of the rear turn mirror rests against the Stop Pin, not on top of and not below.



2. Replace the Mirror Clamps and screw them in.

4.1.1 Removing the LCD

Before you attempt this, do what it says in Section 4.1 Removing the Rear Turn Mirror.

WARNING

Do not remove the LCD until you remove the rear turn mirror. The rear turn mirror covers the bottom part of the LCD electronics board. See “Removing the Rear Turn Mirror” on page 70.

Removing the LCD assembly

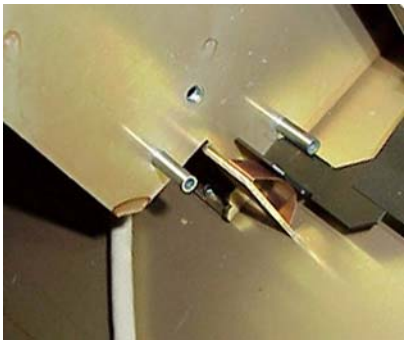
(Pictures are from the rear)

After you remove the rear turn mirror, follow these steps:

1. Disconnect the LCD cable from the LCD electronics board.

2. Lift the LCD assembly from the center of the top with one hand,

and help the bottom of the LCD frame come up past the copper spring with the other hand.



3. Lift the LCD assembly up.

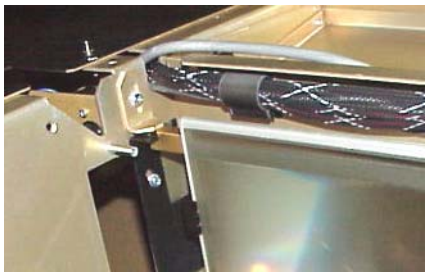
CAUTION

As you remove the LCD assembly, take care that it does not touch any other parts. You could scratch the polarizer or other optical parts, and this may show in the picture.

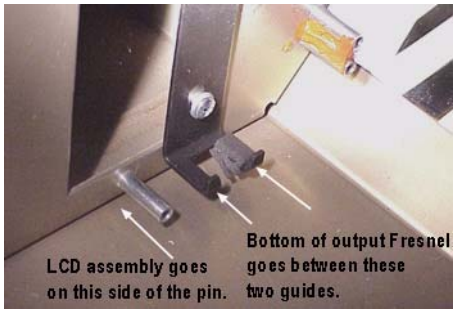
Take care where you put the LCD assembly. It may be best to stand it on the bottom and lean it against something, so the optical parts do not touch anything.

Replacing the LCD assembly

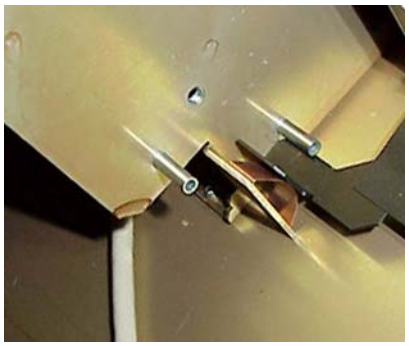
1. The LCD assembly should be to the rear of the guide pins.



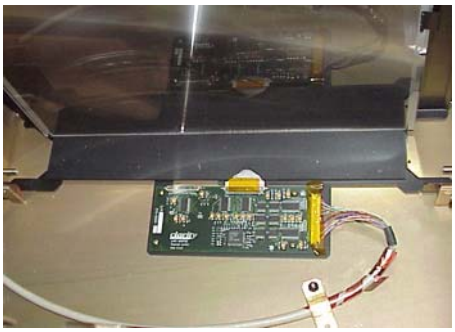
Output Fresnel in place, rear view. LCD assembly goes to the rear of the pin.



2. The bottom of the LCD assembly must engage the spring clip.



3. Be sure to plug in the LCD connector at the bottom.



✎ The LCD is *not* clamped in place. It must be loose so the alignment motors can move it.

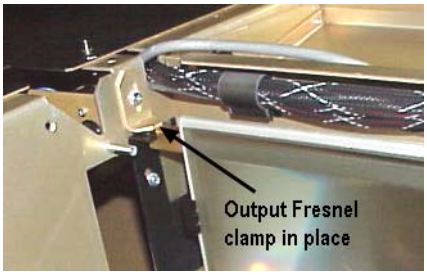
4.1.2 Removing the Output Fresnel

You can remove the output Fresnel without removing the LCD assembly or the rear turn mirror.

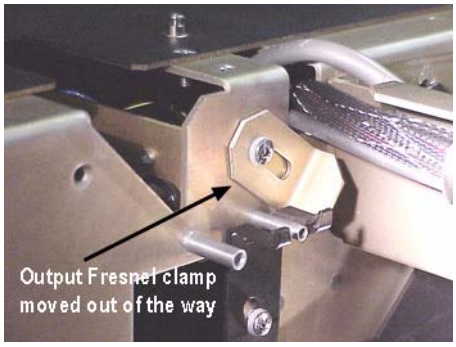
The pictures in this section show the rear turn mirror and the LCD assembly already removed, although you can remove the output Fresnel without removing either of these first.

Removing the output Fresnel

The output Fresnel hangs on two pins between guides at left and right. A clamp holds it in place.



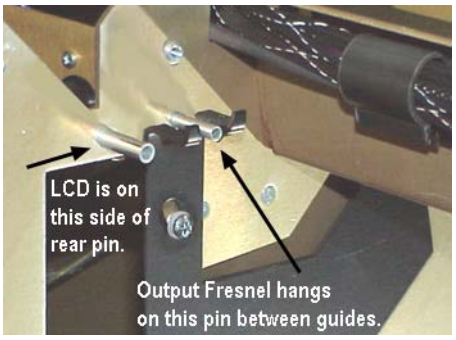
1. Loosen, but do not remove, the clamp screw and move the clamp aside. It is difficult to replace the clamp screws, and there is no need to remove them.

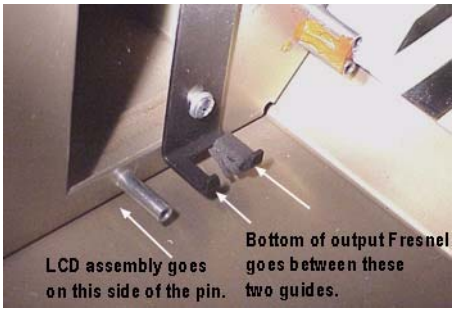


2. Lift the output Fresnel straight up. Do not let it touch anything in the LCD assembly, if that part is still in place.

Installing the output Fresnel

Examine the guides for the output Fresnel and compare what you see with these pictures.





✎ Do not tighten any of the screws on the guides for the output Fresnel. These screws must remain loose.

1. If you have not already done so, move the clamps out of the way.
2. Lower the output Fresnel into its space.
   a) The lower rail *must* go between the lower guides.
   b) The upper rail *must* rest on the upper pin and sit between the upper guides.
3. Press the output Fresnel down to be sure it is resting on the pins on each side.
4. Move the clamps into place and tighten their screws.

5 Maintenance

5.1 General Maintenance Guidelines … 76

5.2 Opening and Closing the Screen … 78

5.3 Changing a Lamp – Lowering Light Tower … 80

5.3.1 Changing a Lamp – Replacing the Lamp … 82

5.3.2 Changing a Lamp – Raising Light Tower … 84

5.4 Changing the Rotator or ColorPlus Filter … 86

5.5 Changing the Air Filters … 88

5.6 Cleaning the Screen and Mirrors … 90

5.1 General Maintenance Guidelines

Here is a list of what needs to be done and when. The details of each procedure are in the following parts of this section.

Lamps

Change the lamp when it fails. The lamp life is 8000 hours, but this does not mean you should change the lamp when it reaches this age.

Half the lamps of a large sample will last longer than 8000 hours, some of them considerably longer.

- 5.3 Changing a Lamp – Lowering Light Tower
- 5.3.1 Changing a Lamp – Replacing the Lamp
- 5.3.2 Changing a Lamp – Raising Light Tower

Rotator or ColorPlus™ filter

This filter deteriorates over time with all the light energy passing through it. This should be done every 8000 hours of Runtime.

- 5.4 Changing the Rotator or ColorPlus Filter

Air filters

Change these when the get dirty. How long will that take? That depends entirely on the environment. In some dusty, dirty locations you may have to change the filters every three months. In clean environments Pumas can go for more than a year.

Check the filter every few months in a new installation to determine how fast they accumulate dirt and dust.

- 5.5 Changing the Air Filters

Screen and mirror cleaning

In dusty environments you may have to do this more often, just like air filters. As a routine, check the mirrors and screens just after any maintenance or repair. Digging around in a Puma you are likely to touch the large mirror with you head or hand and leave a grease spot.

- 5.6 Cleaning the Screen and Mirrors

5.2 Opening and Closing the Screen

There are two types of screens for Puma, acrylic and glass, and they open with different methods. All maintenance can be accomplished from the front or the rear.

✎ If the wall is tilted, you may have to loosen the retaining screws from the inside.

To open a glass screen

1. Press a suction cup at one corner of the screen.
2. Pull out sharply about ½" (12 mm). The screen will pop out at this corner.
3. To release the suction cup, pinch the two rubber posts together.

To open an acrylic screen

⚠ ***WARNING***

Do not use a suction cup with acrylic screens. You could damage the screen.

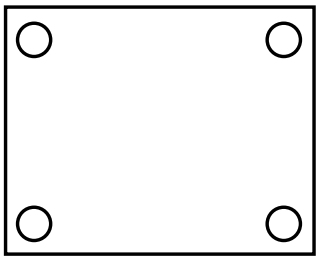
Screens are opened with a "pusher" just enough to release the spring latch. The pusher is operated with a 5/16" nut driver or socket wrench.

Turn the nut driver in the direction of the arrow. There are nuts on all four corners of the screen, but you only need to do the two sides. Use either the top or bottom nut to release both spring latches on that side.

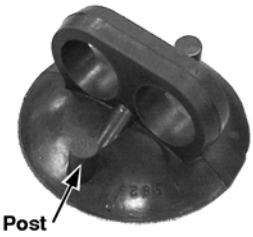
✎ Before you push the screen back on, turn the "pushers" back to their recessed position so the screen can latch.

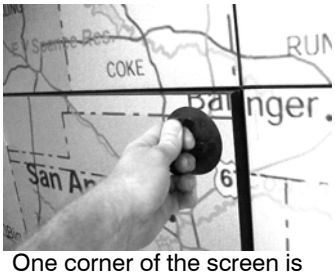
Closing the screen

4. Lift the bottom of the screen and fold the screen props out of the way. They fit down into the screen.
5. Let the screen hang vertically.
6. Slide the screen in evenly until it touches the Puma frame.
7. At each corner, press the heel of your hand against the screen. *Do this only in the corners.* Press in sharply and you will here each corner snap in and the spring latches take hold.
8. Clean the screen where your hands touched it. (See "Cleaning the Screen and Mirrors" on page 90.)



To open a **glass** screen, place the suction cup at the corners.





One corner of the screen is pulled out.

Release the suction cup by pulling in on the posts.

Acrylic screen from the rear, **not** installed on a Puma, showing the screen removing mechanism. The screen “pusher” is now recessed. Use a 5/16" nut driver to turn in the direction of the arrow.

Working inside the Puma with the screen in the propped position

Looking at the screen slide from inside the screen. Screen is open and vertical.

Same view, but screen is pulled out at the bottom. Screen prop is half way up.

Same view; screen is pulled out at bottom and screen prop is engaged.

5.3 Changing a Lamp – Lowering Light Tower

You can change a lamp from the front or the rear.

When to change the lamps

Change a lamp when it fails. It is not good practice to change the lamp when it approaches or reaches its specified lamp life. Many lamps function for thousands of hours after they reach their specified lamp life. Remember, the lamp life number applies to a large sample of lamps, not just *this one*.

How to change a lamp from the FRONT

To change a lamp, you must first lower the light tower.

1. Open the screen (see "Opening and Closing the Screen" on page 78).
2. Turn off the main power switch and remove the power cord.

WARNING

Do not change a lamp with the AC power on. There is voltage on the lamp terminals even when they are off.

3. Loosen the two screws on the light tower cover.
4. Notice the keyhole slots on the two front corners and one rear corner. (Some Pumas do not have thele keyhole slots.) Pull the light tower cover forward and remove it.
5. Loosen the two light tower screws *toward the back* of the light tower. The light tower should still be held up by a spring latch.
6. Pull down on the light tower to release the spring latch *but keep holding it*.
7. Lower the light tower *slowly* as you push it to the rear. At the bottom of the tower's travel, the tab stops *must* catch the rear of the chassis. If they do not, the tower will continue down to scratch a mirror. (See photo, bottom of page, opposite.)
8. Now go to "Changing a Lamp – Raising Light Tower" on page 84.

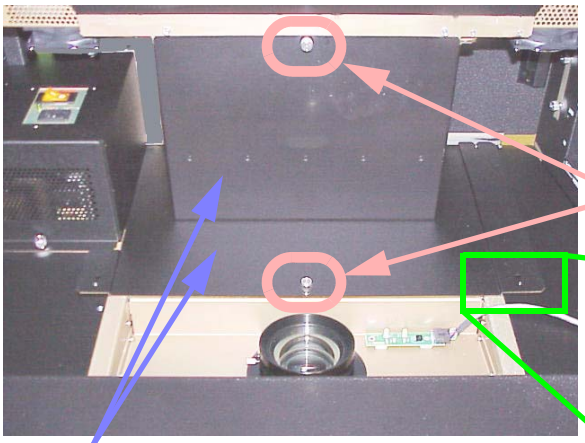
How to change a lamp from the REAR.

9. Remove the rear panel (12 quarter-turn screws).
10. Turn off the main power switch and remove the power cord.

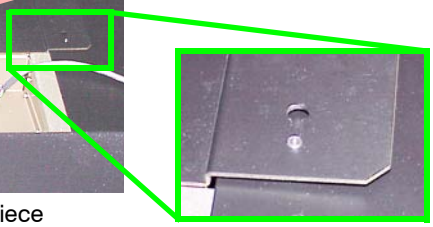
WARNING

Do not change a lamp with the AC power on. There is voltage on the lamp terminals even when they are off.

11. Loosen the two screws on the light tower cover. You have to reach around front to do this.
12. Notice the keyhole slots on the two front corners and one rear corner. Push and lift the cover forward out of the way.
13. Loosen the two light tower screws toward the back of the light tower. The light tower should still be held up by a spring latch.
14. Pull down on the light tower to release the spring latch *but keep holding it*.
15. Lower the light tower *slowly* as you pull it to the rear. At the bottom, the tab stops *must* catch the rear of the chassis. If they do not, the tower will continue down to scratch a mirror. (See photo, bottom of page, opposite.)
16. Now go to "Changing a Lamp – Raising Light Tower" on page 84.

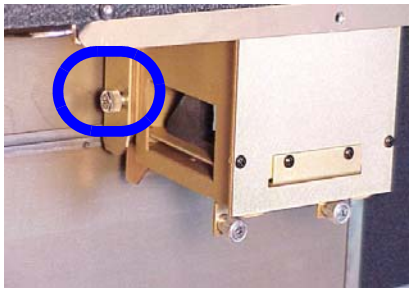


Screws that hold light tower cover

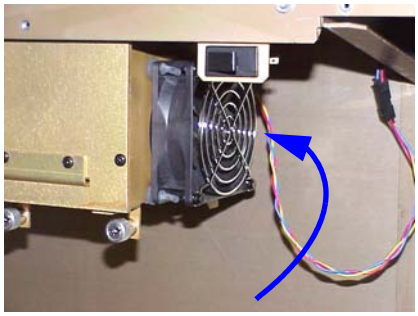


Front view, light tower cover, all one piece

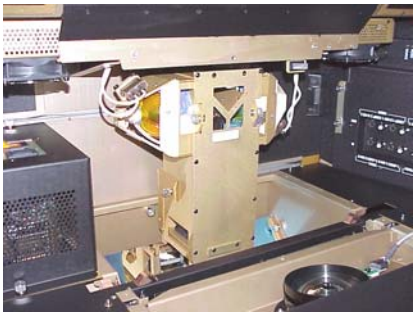
On some Pumas, the light shield does not have keyhole slots, as shown here, and there are no pins to fit into keyholes.



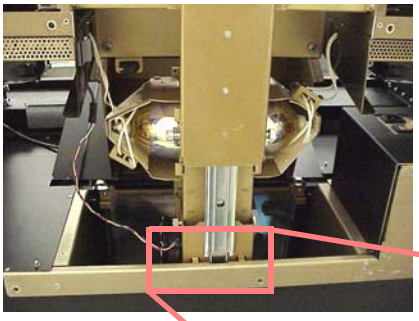
Light tower in raised position, looking at it from the **front left** side. The circled screw is one of two that hold up the tower.



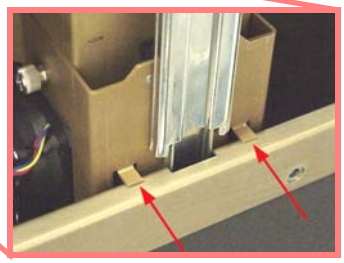
Light tower in raised position, looking at it from the **front right** side. The second screw is behind the optics fan.

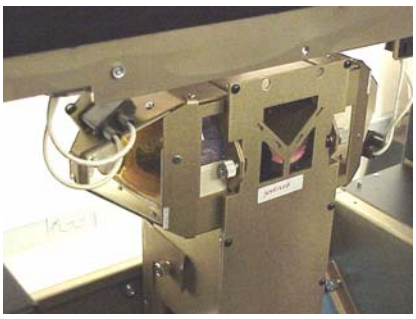


Light tower in lowered position, seen from **front left**



Light tower lowered, as seen from **rear**, showing tab stops resting on rear of main chassis.





5.3.1 Changing a Lamp – Replacing the Lamp

After the light tower is lowered (see "Changing a Lamp – Lowering Light Tower" on page 80) you can remove and replace either lamp.

WARNING
Do not change a lamp with the AC power on. There is voltage on the lamp terminals even when they are off.

✎ If you have now lowered the light tower, see "Changing a Lamp – Lowering Light Tower" on page 80.

Removing a lamp

1. Disconnect the lamp plug.
2. Loosen the lamp screw. The screw is toward the front of the lamp.
3. Remove the lamp. Notice that the lamp is held on the other end with tabs fitting into slots.

Installing a lamp

4. Insert the tabs into the slots at the rear of the light tower.

✎ It is VERY important that these tabs go in the slots. If they do not, the lamp will not be correctly aimed, resulting in diminished light output and a darker picture.

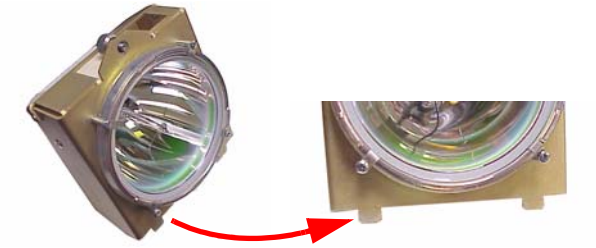
5. Screw in the holding screw *all the way.*

✎ It is VERY important that this screw be tightened all the way. If it is not, the lamp will not be correctly aimed, resulting in diminished light output and a darker picture.

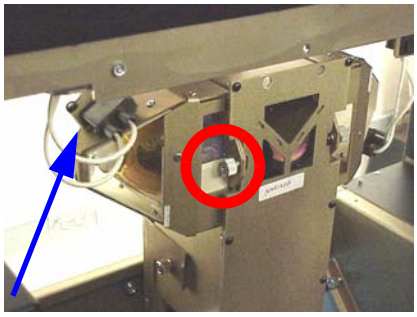
6. Plug in the lamp cord. It is keyed, so it only goes in one way.

Resetting lamp hours

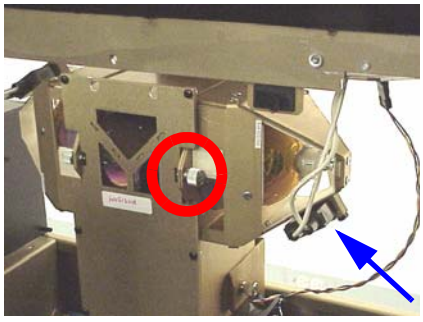
This is not a necessary step, but if you are keeping track of lamp hours for each lamp, don't forget to do this.



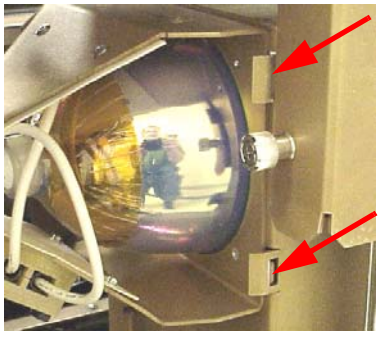
Lamp and tabs on the **front**



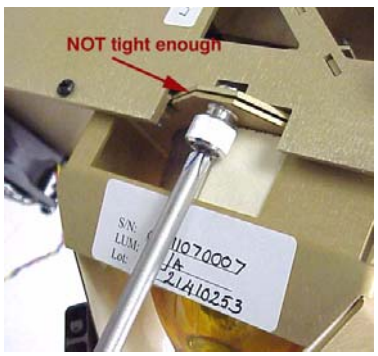
Light tower with lamp screw (circled) seen from the **front left** side. Arrow points to lamp plug.



Light tower with lamp screw (circled) seen from the **front right** side. Arrow points to lamp plug.



Lamp tabs seen from **rear**. The screw in this picture is for the light tower, not the lamp.



5.3.2 Changing a Lamp – Raising Light Tower

Raise the light tower until it snaps into place, then tighten the two screws and re-install the cover.

Raising the tower

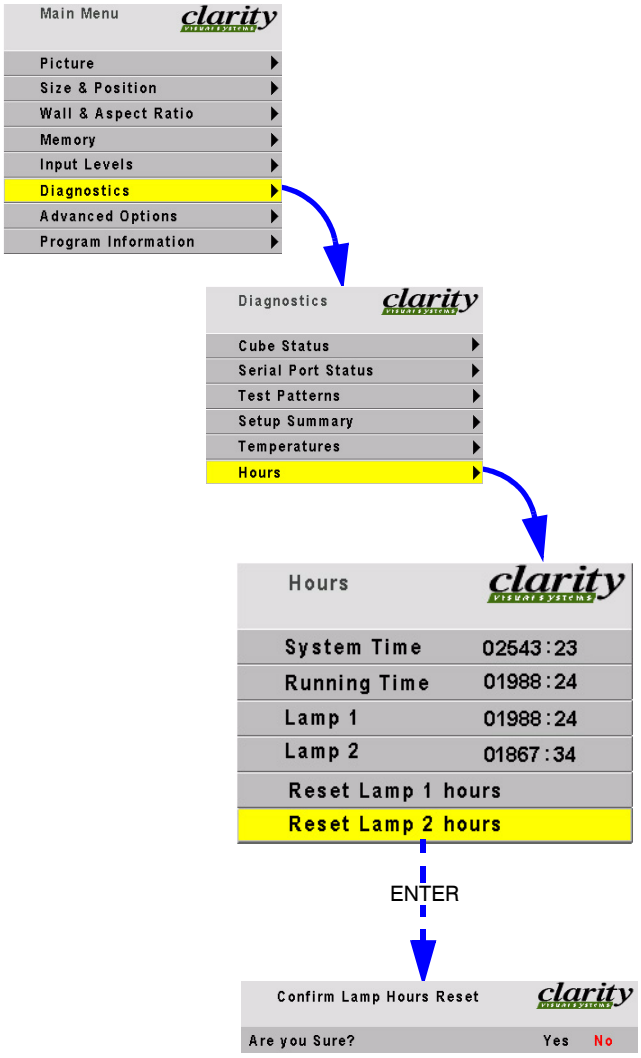
1. Raise the light tower straight up until it clicks into place with the spring latch.
2. Tighten the two screws that keep the tower up.
3. Reinstall the light tower cover.
   a) Slide the cover toward the rear, getting the two keyhole cutouts and one slot to slip under their respective pins.

✎ Some Pumas have a light shield without keyholes and there are no pins.

   b) Tighten the two screws. From the rear, you will have to reach around to do this.

After you change a lamp

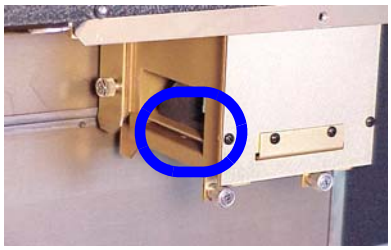
When you put in a new lamp, reset the time counter for that lamp.



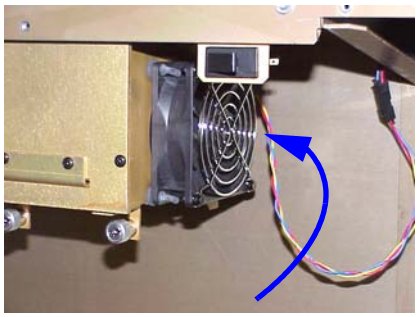
4. Press MENU.
5. Select Diagnostics and press ENTER.
6. Select Hours and press ENTER.
7. Select the lamp number you replaced. Lamp 1 is on the **left** as you view the Puma from the **front**. Press ENTER.
8. Press the left arrow key to select Yes (red) and press ENTER.

Why reset lamp hours?

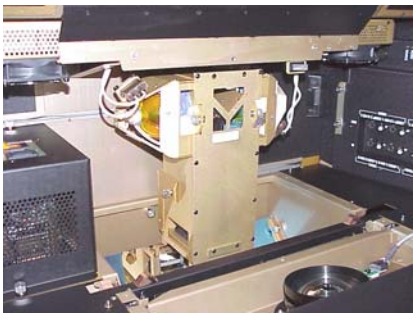
This is for your information and your records only. It is not required for operation or for warranty replacement.



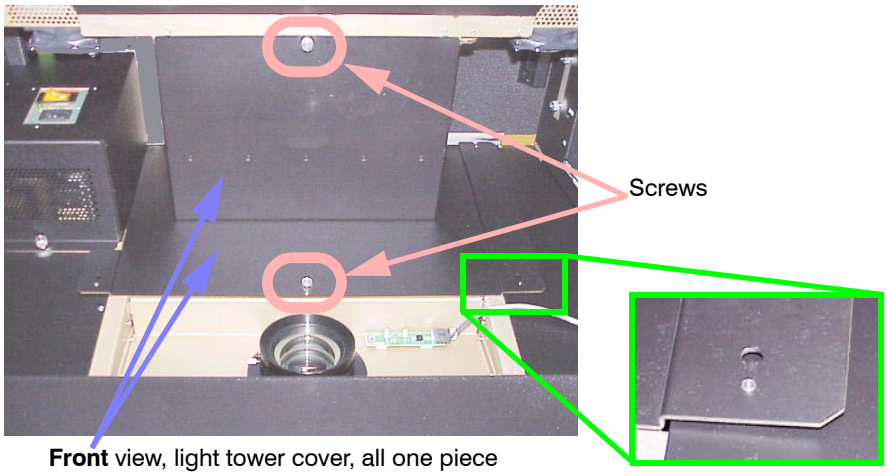
Light tower in raised position, looking at it from the **front left** side. The circled screw is one of two that hold up the tower.



Light tower in raised position, looking at it from the **front right** side. The second screw is behind the optics fan.



Light tower in lowered position, seen from **front left**



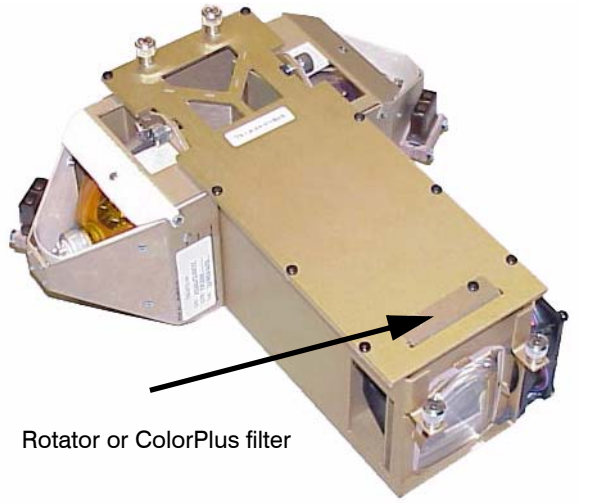
Front view, light tower cover, all one piece

On some Pumas, the light shield does not have keyhole slots, as shown here, and there are no pins to fit into keyholes.

5.4 Changing the Rotator or ColorPlus Filter

The Puma has either a rotator or a ColorPlus™ filter at the output end of the light tower. This needs to be changed periodically.

The light tower has a rotator or a ColorPlus™ filter at its output end, the end opposite the lamps. This filter

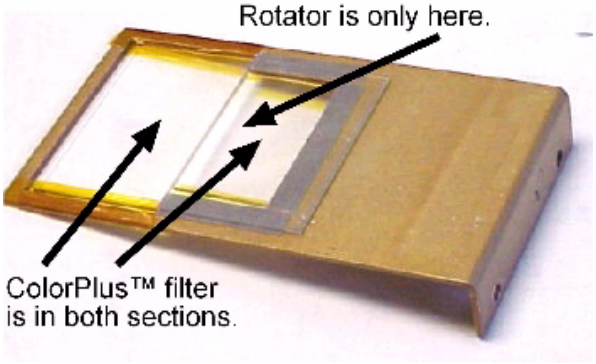


Rotator or ColorPlus filter

is subject to deterioration over time because the high light intensity it receives.

Replace this filer every 8000 hours of Runtime. "Runtime" is the total amount of time that any lamp is lit. To see Runtime, follow the menus shown.

✎ The ColorPlus filter is an option only available in Puma XP or X, and not in Puma UXP. If you did not order this option you have the standard rotator.



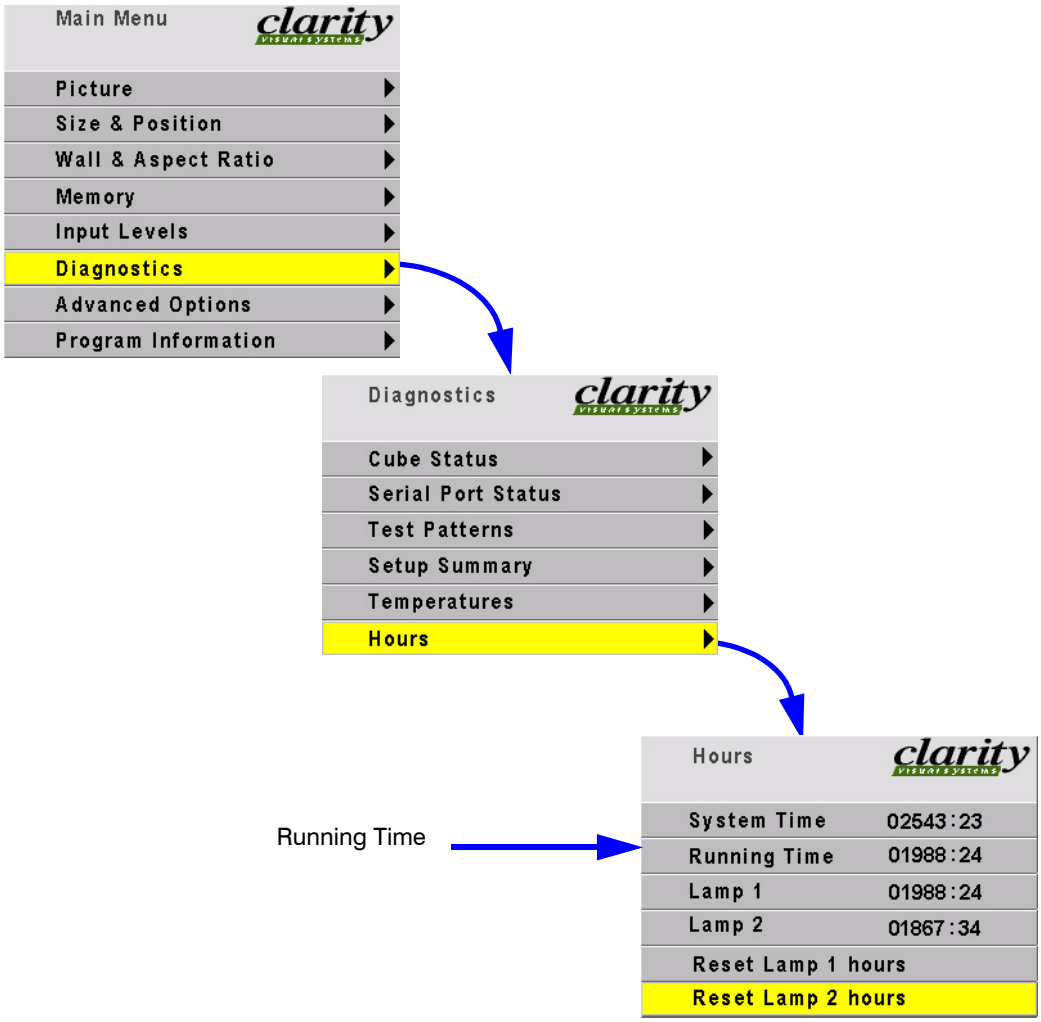
It is important that you replace the filter with the same type.

- Rotator Assembly, 990-1014
- ColorPlus, 990-0174

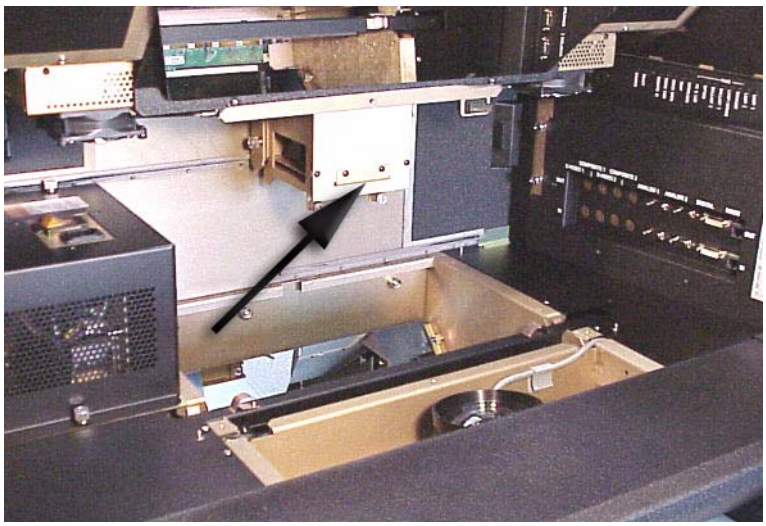
The filter is held in place with two screws. It is easily replaced from the front (and still possible from the rear) without lowering the light tower.

WARNING
Always turn off the lamps and turn off the main power switch before changing this filter.

1. After you turn off the main power switch, remove the light shield.
2. Unscrew and remove the filter.
3. Inspect the filter. Deterioration will be evident by discoloration of the filter material. If there is discoloration, or if the filter has been in place for 8000 or more hours of Runtime, replace it.
4. Replace the light shield.



Location of filter



5.5 Changing the Air Filters

Inspect air filters whenever you are working on the Puma, but at least twice a year.

When to change air filters

When should you change the air filter? When it gets dirty.

How long will it take to get dirty? That depends on the environment and the amount of time the fans run.

If the Puma is installed in a room as it is built or renovated, there will be lots of dust in the air. If the Pumas are running, this dust will get sucked into the air filters.

If the Puma is in a relatively clean environment, dust will naturally accumulate more slowly.

By observing the filters from time to time, you can determine how long they can function in a given situation.

✎ The two enemies of any display system are dust and heat.

Agents that clog air filters

These agents or factors are particularly hard on air filters in Clarity displays, filling them with dust and dirt faster than normal:

- Subways have lots of metal or rubber particles plus other dirt floating in the air.
- Shredder—A wall of displays had a paper shredder tucked out of the way behind them.
- Airports generate lots of dirt particles, particularly in the baggage area.
- New construction generates dust from sawing wood and drywall board. Any "clean" environment, such as a board room, that undergoes renovation will also generate dust.
- Fast food restaurants generate grease particles.

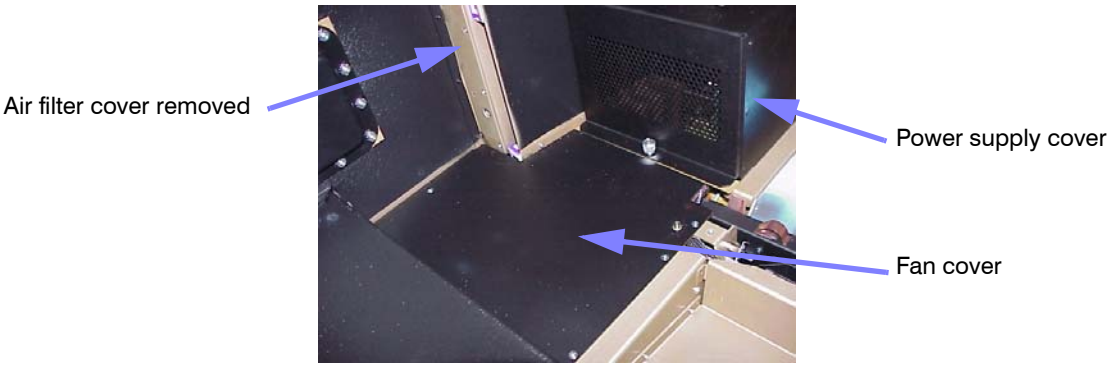
It's perfectly safe to use Clarity Visual Systems displays in these environments, but you should check the air filters more often. If the environment changes (new construction) increase your vigilance.

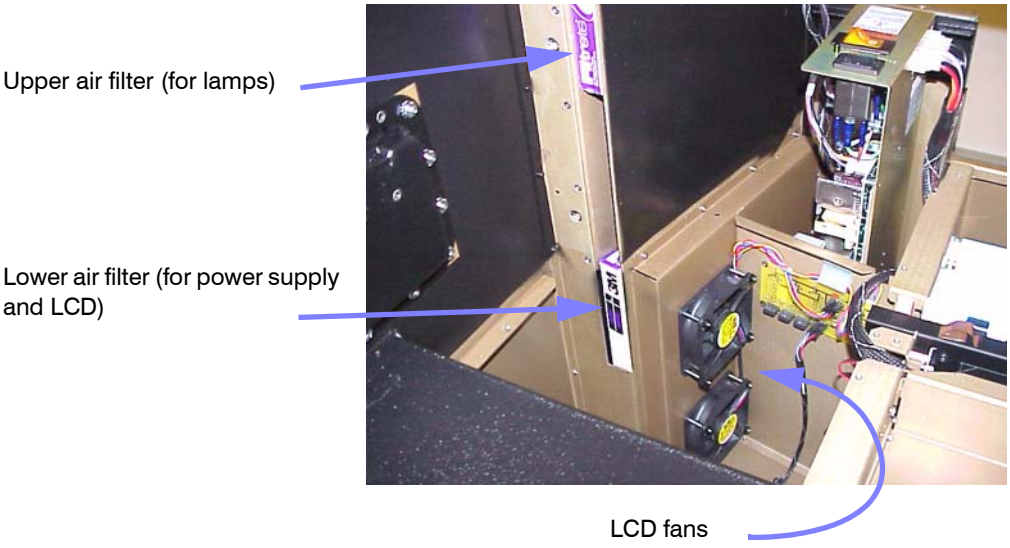
It's easier to change the air filter than to take the Puma apart and clean the optical system.

How to change the air filters

✎ All pictures are shown from the front.

1. Remove the air filter cover. You can see the two air filters now.
2. It will be easier if you remove the power supply cover and the fan cover, too.
   a) The power supply has two captive screws.
   b) The fan cover has 6 Philips screws. You must remove the power supply cover first, then the fan cover.
3. Remove the upper filter first by pulling down on it.
4. Pull up on lower filter to remove it, Tilting the top corner toward you.
5. When you install new filters, pay attention to the AIR FLOW arrow on the filter. The arrow should point toward the center of the Puma. Install the lower filter first, then the upper filter.


Air filter cover removed
Power supply cover
Fan cover


Upper air filter (for lamps)
Lower air filter (for power supply and LCD)
LCD fans

5.6 Cleaning the Screen and Mirrors

Any good cleaning solution will work well, as long as you do not spray it directly on the screen.

⚠ ***CAUTION***

Whether the screen is glass or acrylic, don't lean on it. Don't let it get scratched. Protect it.

⚠ ***CAUTION***

Spray the cleaner on the cloth. NEVER spray anything on the screen. Do not let any liquid drip down the screen. It will wick up between the screen layers. When liquid gets between the screens, it is *impossible* to remove. The screen is permanently ruined.

Why is the screen ruined?

The screen is made of several layers. The outer layer is glass, but there are inner layers of acrylic that are Fresnel lenses. If liquid runs down the screen, collects at the bottom and wicks up between these layers, it is impossible to get it out.

Both sides

You can safely clean both sides of the screen, as long as you are careful to prevent liquid from running down to the bottom of the screen.

Cleaners to use

Claire #50 Glass Cleaner is good glass cleaner. It is a foaming spray in a pressurized can. It is sold under many different names by local companies that sell janitor and building maintenance supplies.

In some parts of the world this same cleaner is known as **Sprayway #50 Glass Cleaner**. Ask at a janitor supply company for either of these cleaners. Hundreds of supply companies sell this product under their own brand name.

Glass Wax™ does a good job of cleaning the screen. It is a thick, pink liquid. Put some on a clean, damp cloth and or a clean, damp sponge and spread it thinly on the screen. Let it dry. Wipe up the powder with a clean, dry cloth.

Plain soapy water

You can use plain soapy water to clean the screen. Use a mild liquid soap, very dilute. Wring out or squeeze out *most* of the water. (Read the Cautions on this page.) Wipe carefully with the damp cloth. Dry with a second cloth.

Cleaners NOT to use

- Do not use any cleaner that has an abrasive material, such as sink and porcelain cleaners, or cleaning compounds that contain pumice. These damage the anti-reflective coating.
- Do not use alcohol on the screen, unless you use it in very small, very controlled areas *not* near the edge. Alcohol can very quickly run down to the edge and wick up between the layers. Alcohol will dissolve some of the material of the black glass screen and make it useless. The *only* way to fix this is to buy a complete new screen.
- Do not use a 'clean' cloth that has been used to wipe something else, such as a table. There could be microscopic particles of grit in the cloth, and these can scratch the screen.
- Do not use a sponge that has been used to clean other things. It is very difficult to get grit out of a sponge, once it is in there. Buy a new sponge, and keep it for this purpose only.

What to use for a cloth

White cotton cloth is better for cleaning than colored cloth. The dyes in some colored cloth tend to make it less absorbent.

Paper towels tend to leave lint. A better paper towel for cleaning is Scott® Shop Towels. These blue, lintless, paper towels are generally available at auto parts stores, home fix-it stores, and hardware stores.

Cheesecloth is another good choice. This open-weave cotton material is light and absorbent.

Same cleaner for mirrors, lens

You may use the same cleaner for the large mirror and the lens. However, in most instances, the mirror and lens only have dust. It is best to blow this away using clean air, or wipe it away using a clean cloth. Clean, compressed air is available in pressurized cans from stores that sell cameras.

What about dust?

If the mirror has only light dust and nothing greasy or oily, you can wipe the dust of with a dry cloth. Or use a Swiffer™. Swiffers are good at picking up dry dust, but they will not remove oil or grease, and they can't be used with liquid cleaners of any kind.

Where is the dirt?

When you see dirt in the picture, you can sometimes tell where it is by its focus. Use a white test pattern to see the dirt most easily.

Small specs of dirt or dust that are in **very sharp** focus are either on the screen itself, or they are on the LCD.

If the dirt is **slightly out of focus**, it may be on the input or output Fresnel lens.

If the dirt is in **soft focus**, it is probably a smudge on the large mirror.

Dirt on the output lens cannot be seen in the picture. However, that does not mean you should not clean this lens. Dirt here will reduce the brightness of the picture, but it won't show up as specs in the picture.

Stuck pixels

Sometimes you will see a stuck pixel. This will show as a bright spot of color, easily visible on a black test pattern. Stuck pixels are not unusual. Up to ten stuck pixels is within the warranty tolerance, as long as they are not touching each other.

6 Reference Material

6.1 Menu Structures … 94

Picture … 94
Size & Position … 95
Size & Position, Viewport … 96
Wall & Aspect Ratio … 97
Memory … 98
Memory: Recall … 99
Memory: Save … 100
Input Levels: Analog Sources … 101
Input Levels: Digital Sources … 102
Input Levels: Video Sources … 103
Diagnostics: Cube Status … 104
Diagnostics: Serial Status … 105
Diagnostics: Test Patterns … 106
Diagnostics: Setup Summary … 107
Diagnostics: Temperature … 108
Diagnostics: Hours … 109
Advanced Options: Miscellaneous Options … 110
Advanced Options: Color Balance … 111
Advanced Options: Lamp Settings … 112
Advanced Options: Serial Port Settings … 113
Advanced Options: Auto Setup Options … 114
Advanced Options: LCD Alignment … 115
Advanced Options: Menu Options … 116
Program Information … 117

6.2 Remote Control Functions … 118

6.3 Analog Mode Tables … 122

6.4 Puma Drawings … 130

6.5 Connector Wiring … 134

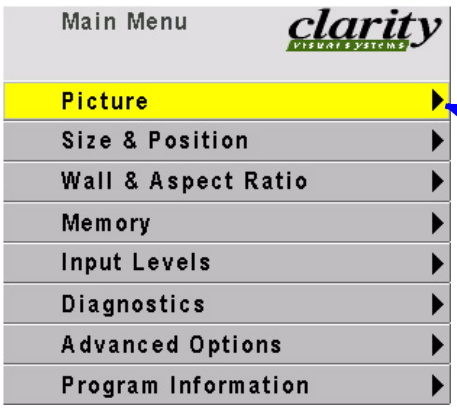
6.6 Regulatory Information … 136

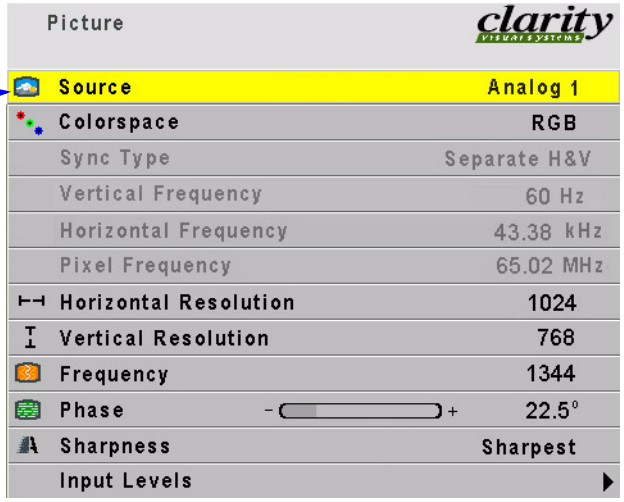
6.7 Meaning of Terms … 138

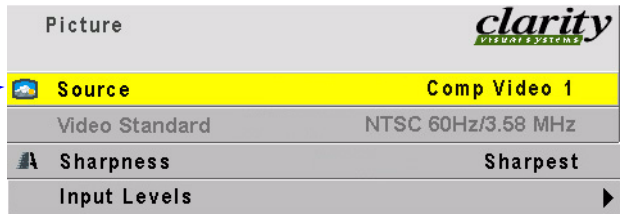
6.8 Specifications for Puma … 142

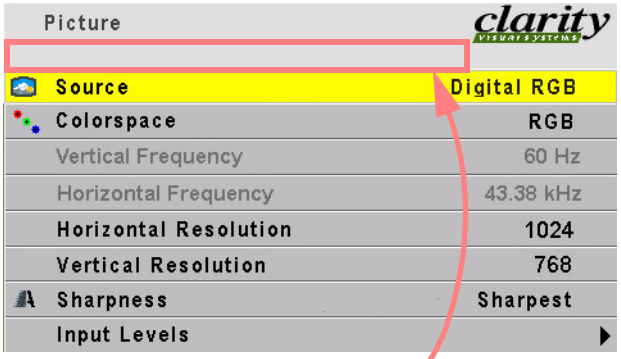
6.1 Menu Structures

Picture



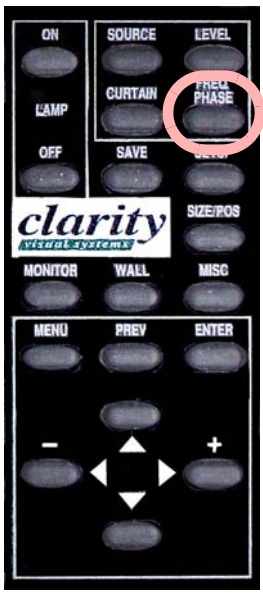






The Picture menu has different items depending on the current source type. You cannot adjust Frequency in Digital pictures, so that item is not in the Picture menu when the selected source is Digital. You cannot adjust Horizontal Frequency in Analog, because that is determined by the source, so it is grayed out.

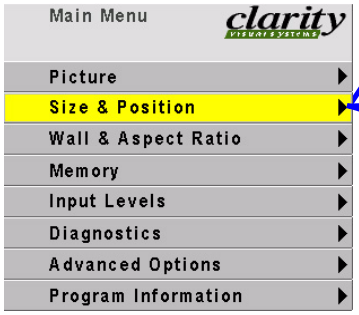
In the Source item, the left-right keys choose the source. Other items can be adjusted if they are not grayed out.

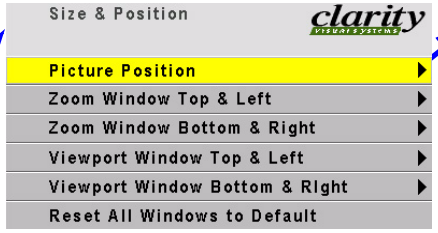


The **Freq**/**Phase** button opens the **Picture menu** directly.

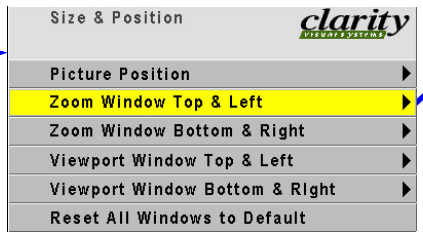
In most menus, this area describes what the selected (highlighted) function will do or what it is used for.

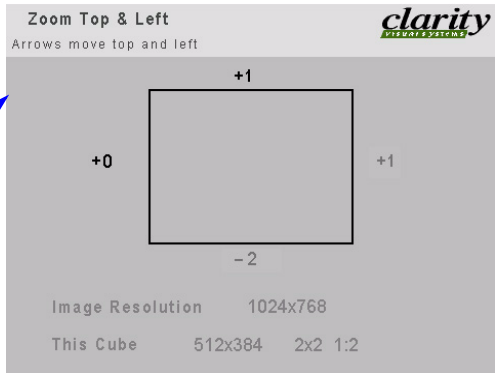
Size & Position



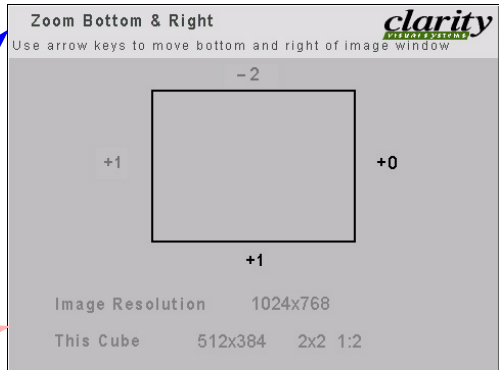


Picture Position moves the picture electronically in four directions. It does not change the size of the picture.





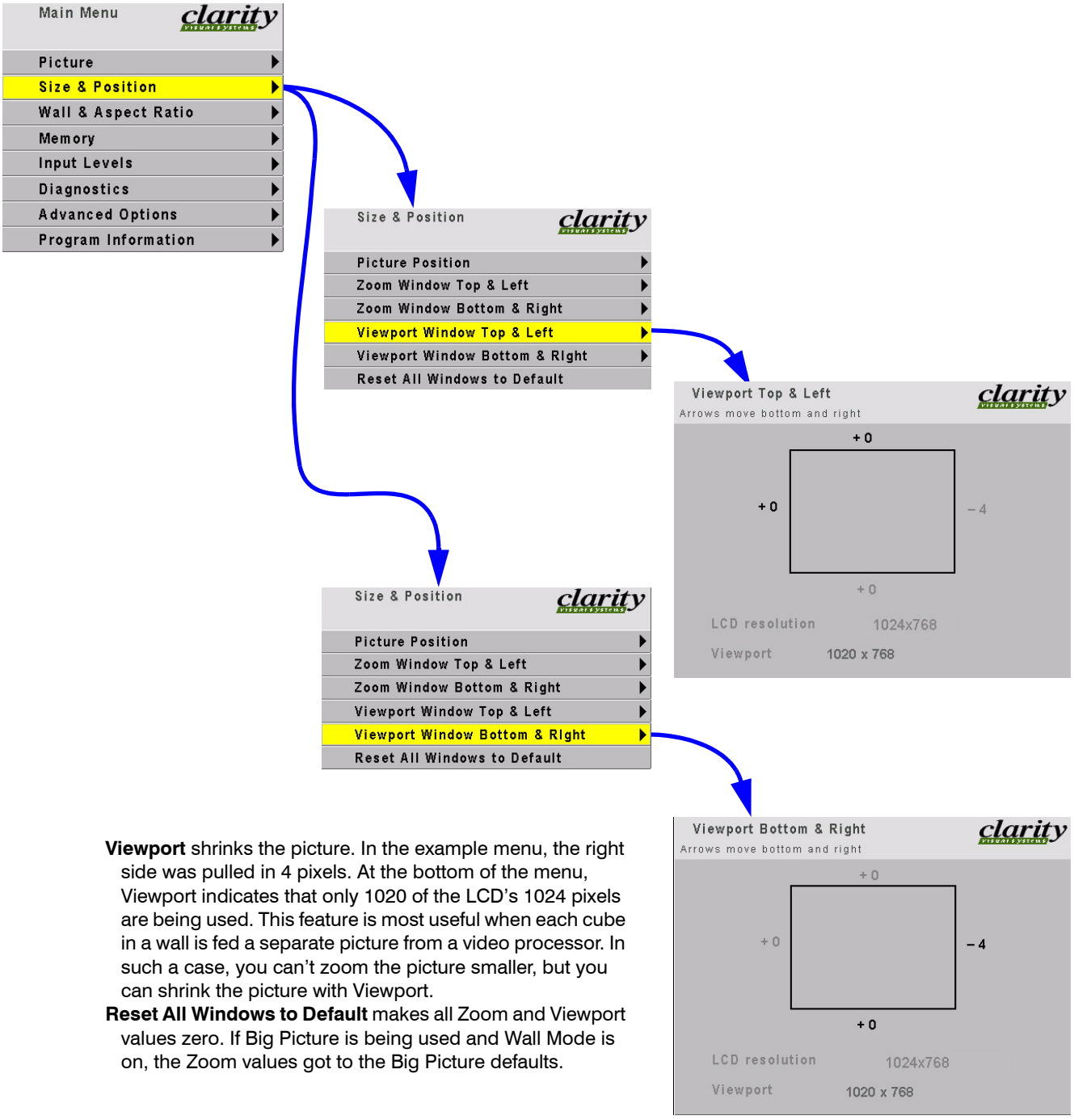
Zoom adjusts the size of the picture. In Zoom Top & Left, the up-down arrows move the top edge, and the right-left arrows move the left side.



The **Size**/**Pos** button opens the Picture Position menu.
Press it a second time to open the Zoom Top & Left menu.
Press it a third time to open the Zoom Bottom & right menu.

The Image Resolution numbers show the resolution of the entire picture coming into the Puma. “This Cube” shows the number of pixels used and the Big Picture wall size and cube position:
Width x Height Column: Row

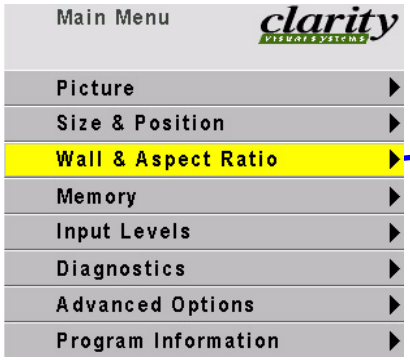
Size & Position, Viewport



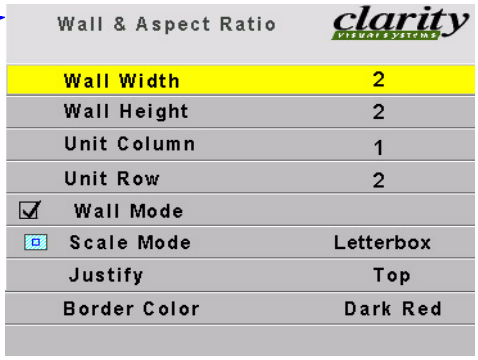
Viewport shrinks the picture. In the example menu, the right side was pulled in 4 pixels. At the bottom of the menu, Viewport indicates that only 1020 of the LCD's 1024 pixels are being used. This feature is most useful when each cube in a wall is fed a separate picture from a video processor. In such a case, you can't zoom the picture smaller, but you can shrink the picture with Viewport.

Reset All Windows to Default makes all Zoom and Viewport values zero. If Big Picture is being used and Wall Mode is on, the Zoom values got to the Big Picture defaults.

Wall & Aspect Ratio



Wall Width and Height determine the dimensions of the Big Picture wall, which is not necessarily the same as the physical wall (it could be smaller). The upper limit is 32 cubes in each dimension. However, this does not mean you can safely stack Pumas 32 cubes high!



Unit Column and **Row** designate where this cube is in the defined wall, which is not necessarily the same position as in the physical wall. The Column can never be larger than the Width, and the Row can never be larger than the Height.

When **Wall Mode** is checked (on), each cube shows only its segment of the whole picture. When Wall Mode is unchecked (off), the cube shows the entire picture.

When the aspect ratio of the source picture and the aspect ratio of the cube (or the whole wall when in Wall Mode) do not match, **Scale Mode** and **Justify** are used to fit the picture onto the cube (or wall).

Scale Mode is Fill All, Crop, Letterbox, or Widescreen.

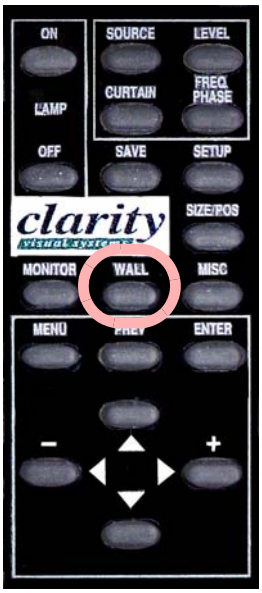
Fill All stretches the picture as necessary on one axis to fill the screen. All of the picture is shown.

Letterbox fills the screen by zooming until the first edges touch the screen edges (sides or top-bottom) and leaves the rest of the screen filled with the Curtain color. All of the picture is shown.

Crop fills the screen by zooming until the second edges touch the screen edges and crops the rest. Some of the picture will be cut off.

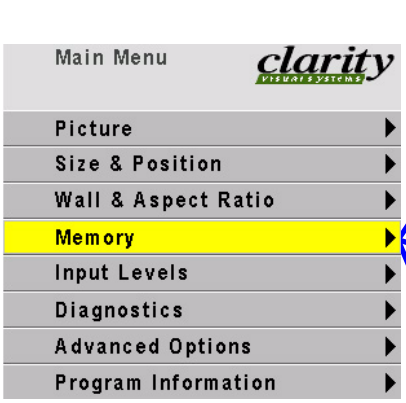
Widescreen forces a 16:9 (1.77) aspect ratio to display compressed DVDs correctly. All of the picture is shown.

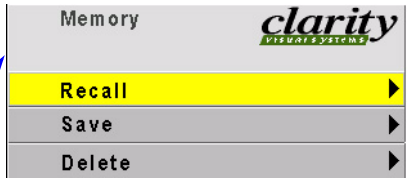
Justify moves the picture to the top, middle or bottom, or to the left, center or right. This has no function when the Scale Mode is Fill All.



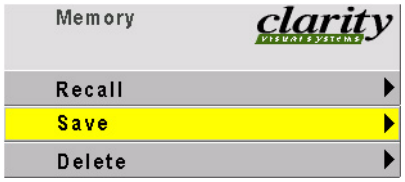
The **Wall** button opens the **Wall & Aspect Ratio** directly.

Memory

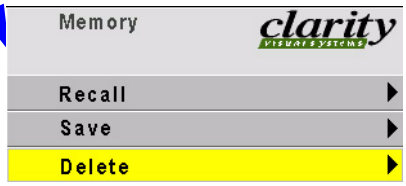




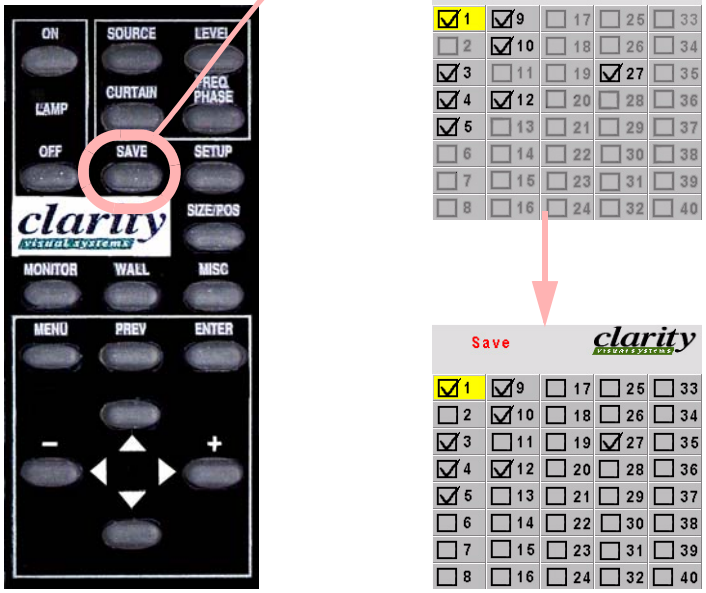
See ”Memory: Recall” on page 99



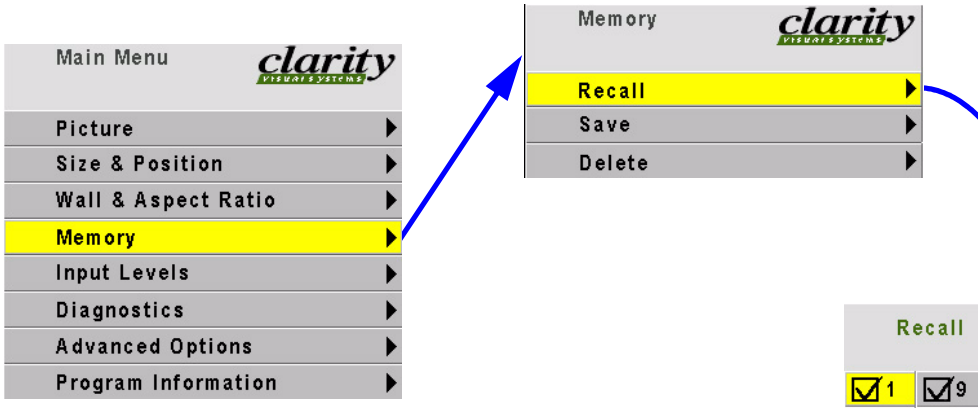
See ”Memory: Save” on page 100

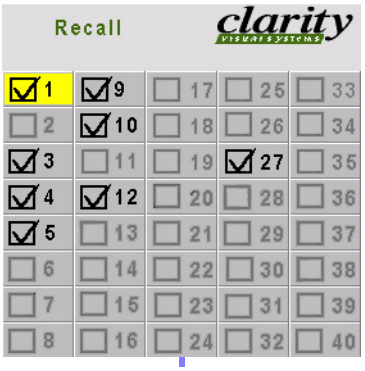


The Delete menu looks like the Recall menu. It is not necessary to delete a memory slot before saving something new.



Memory: Recall



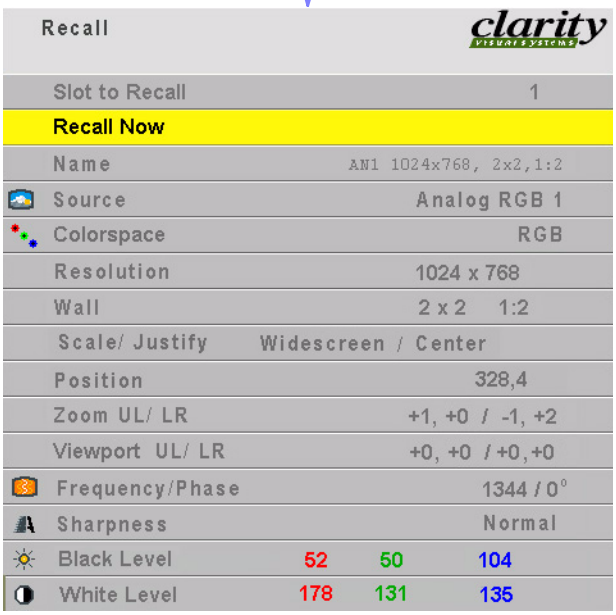


ENTER

In the Recall grid menu, use the arrow keys to navigate through the memories that have something stored in them. The empty memory slots are grayed out and you can't land on them. Press ENTER to open the Recall detail menu.

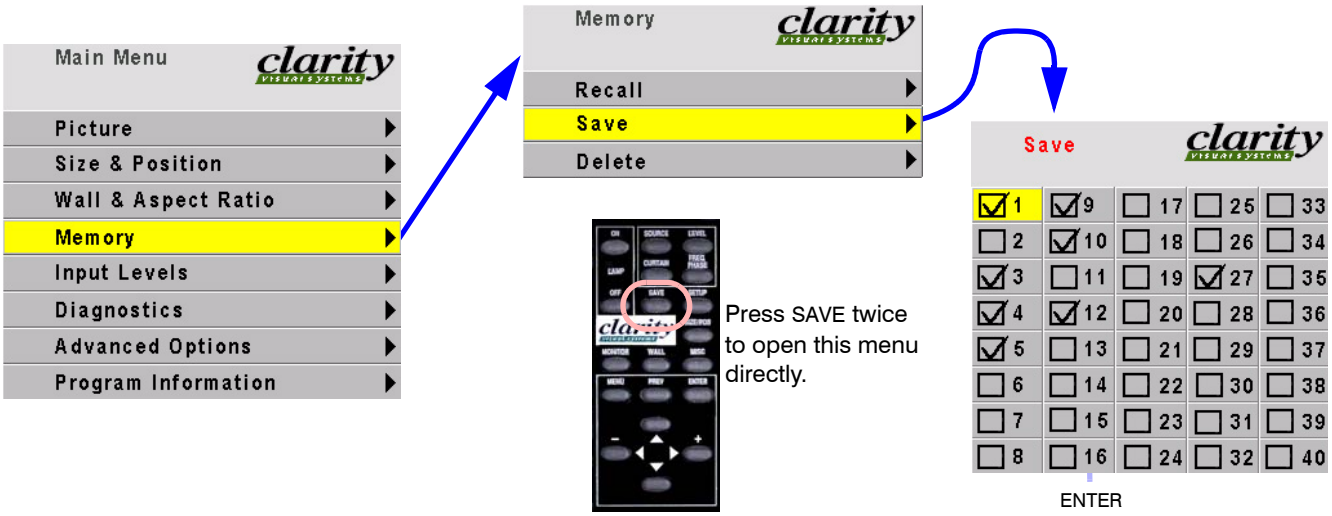
The detail menu shows what will be recalled when you press ENTER again.

When (Current) appears in the Slot to Recall line, it means that the Puma is already doing exactly what this slot would tell it to do.



Press SAVE once to open the Recall grid directly.

Memory: Save



In the Save grid, use the arrow keys to cycle through the available memories. As you navigate through all 40 memories, Save Now ill show (Overwrite), as shown here.

For each empty memory, the Name of the memory is the default name for this slot. You can change this name as described at the below. Many lines are grayed out because you can't change anything here except the name of the memory. The lines in this menu are different for saving different modes: video or digital.

(Overwrite) appears if the Save to Slot number currently has something saved in it.

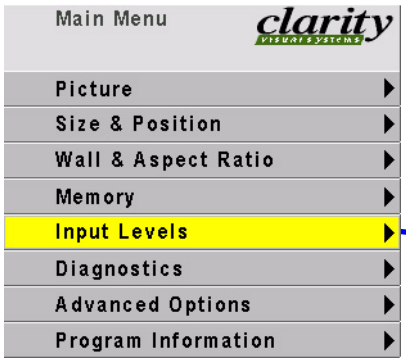
To save, highlight Save Now and press ENTER.

A (Current) notice will appear in Save to Slot to indicate that the save was successful and that the slot now contains exactly what the Puma is doing now.

To change the **Name** of a memory slot, highlight Name and press ENTER. A bar appears below the name which indicates character position. Use the +/– arrows to move the yellow highlight in this bar. Use the up-down arrows to change the character at that position. There are 24 character spaces available.

The default name is an abbreviation of the memory contents: connector used, resolution, wall configuration and wall position (if wall mode is on).

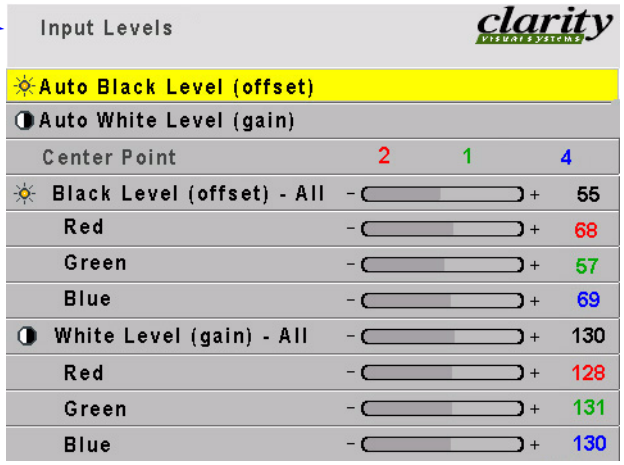
Input Levels: Analog Sources



✎ For Digital Sources, see page 102.

✎ For Video Sources, see page 103

When the source is Analog 1 or 2 and has RGB color-space…
(See “What Does Colorspace Mean?” on page 66)


Input Levels
clarity
Auto Black Level (offset)
Auto White Level (gain)
Center Point 2 1 4
Black Level (offset) - All - + 55
Red - + 68
Green - + 57
Blue - + 69
White Level (gain) - All - + 130
Red - + 128
Green - + 131
Blue - + 130

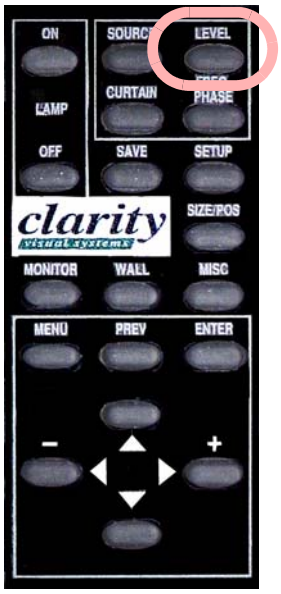
To set levels semi-automatically, display a black picture from the source computer. Choose Auto Black Level and press ENTER. Then display a white picture from the source, choose Auto White Level and press ENTER.

The Puma is now adjusted to the brightest and darkest picture this one source can produce. If you change the computer to a different one, or change the video card in the computer, you should do this adjustment again.

To set RGB levels manually, display a black picture from the source computer. Select Manual Black Level and adjust it until one of the three colors just touches the 0 value. Then adjust the other two colors until they just touch 0 also. Do not push this value “lower” than 0, because the number will not change, but the picture will get worse.

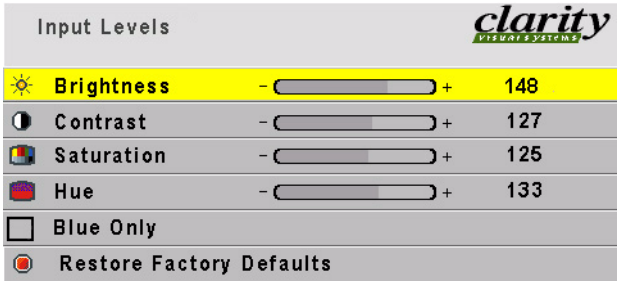
Now display a white picture from the source computer. Select the White levels and adjust them until the value just touches 255. Do not push them “higher” than 255, because the number will not change, but the picture will get worse.

Press LEVEL to open the Manual Levels menu directly.

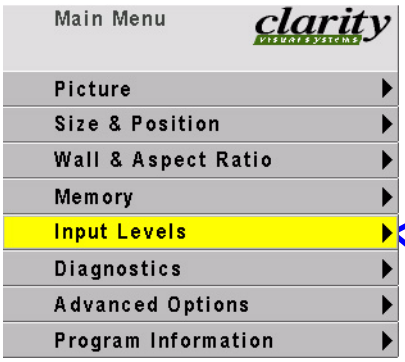


When the source is Analog 1 or 2 and has YPbPr colorspace…
(See “What Does Colorspace Mean?” on page 66)

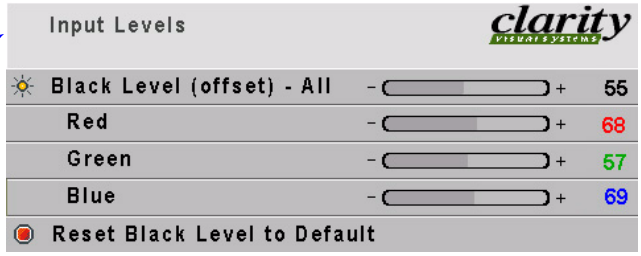
If a color bar pattern is available in YPbPr, turn on Blue Only and adjust Saturation by matching the two outer color bars; adjust Hue by matching the inner two bars.



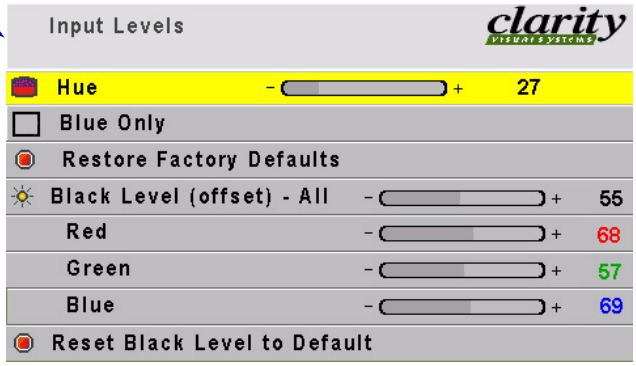
Input Levels: Digital Sources



When the source is Digital and the colorspace is RGB …
(See “What Does Colorspace Mean?” on page 66)

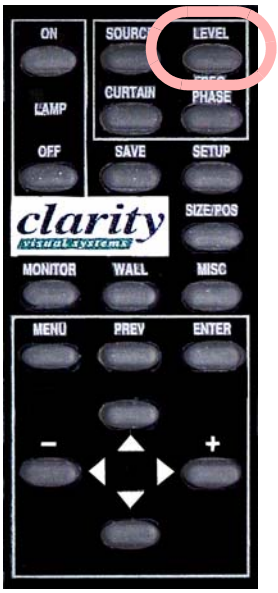


When the source is Digital and the colorspace is YPbPr …
(See “What Does Colorspace Mean?” on page 66)



The digital level controls are not often used, because most digital sources don’t need them. Reset is a button that will return the system to the default values for digital sources.

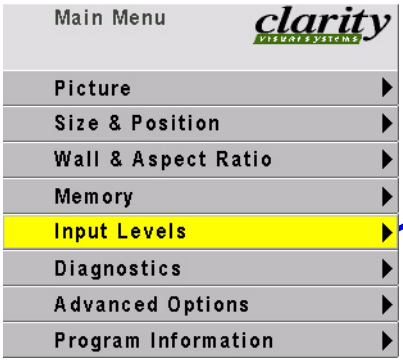
Press LEVEL to open the Manual Levels menu directly.



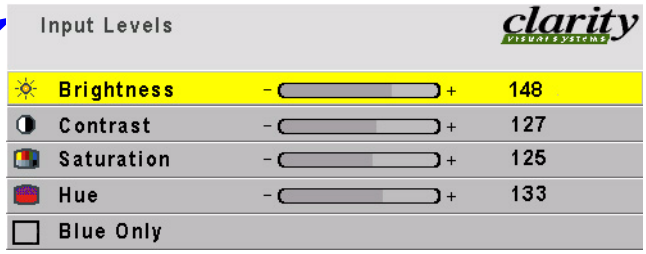
✎ For Analog Sources, see page 101.

✎ For Video Sources, see page 103

Input Levels: Video Sources



When the source is Composite or S-Video…



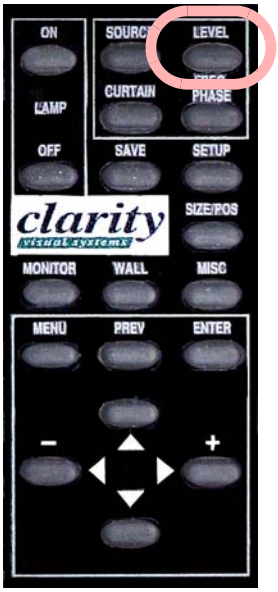
The top items in the Input Levels menu, when the source is video, correspond to similar controls on television receivers (although PAL and SECAM receivers do not use a hue control).

The Blue Only check box is for adjusting the picture with color bars from the source. See “Adjusting to Video Sources” on page 52.

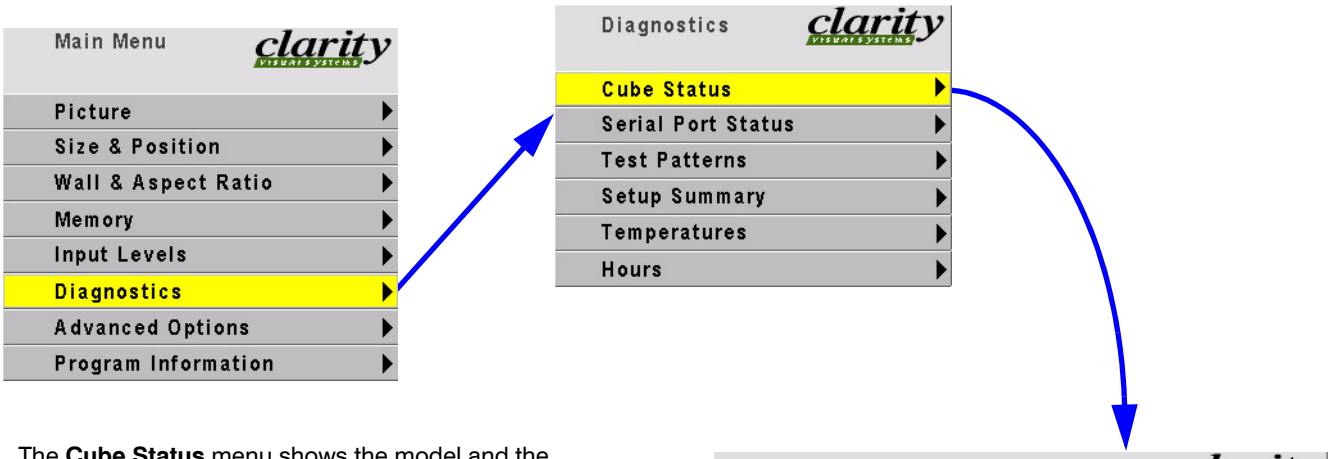
✎ For Digital Sources, see page 102.

✎ For Analog Sources, see page 101

Press LEVEL to open the Manual Levels menu directly.



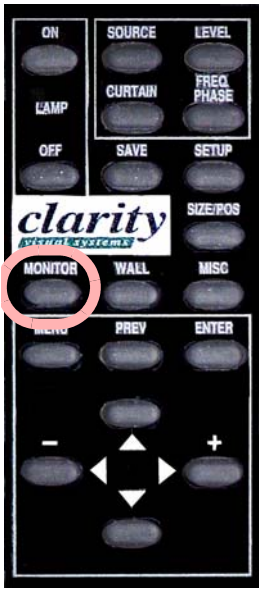
Diagnostics: Cube Status



The **Cube Status** menu shows the model and the status of the lamps and fans. 573- is the firmware number. For Puma XP it will be 573-2010

Fans: **On** when running. When a fan fails, the lamps will not turn on and you can't see this menu.

Lamps: **On**; **Failed** if that lamp is failed to strike.



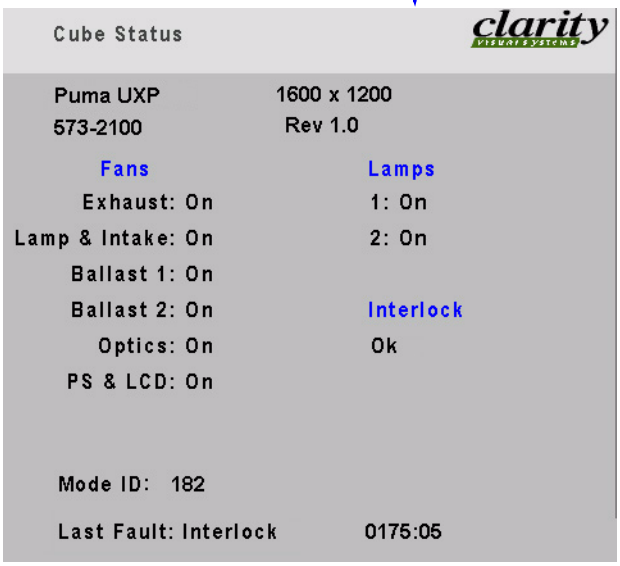
Lamp 1 and **Ballast 1** are on the **left** as you view the Puma from the **front**.

Lamp & Intake Fan is actually 4 fans.

PS & LCD Fan is 3 fans.

Interlock is two interlock switches, one on the rear panel, one on the light tower cover.

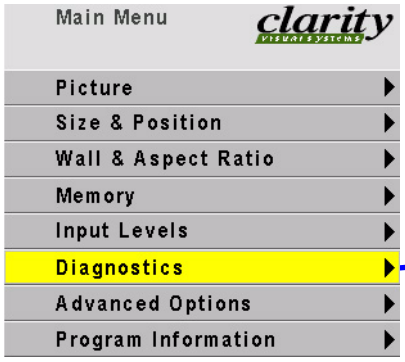
Press MONITOR once to open the Cube Status menu.

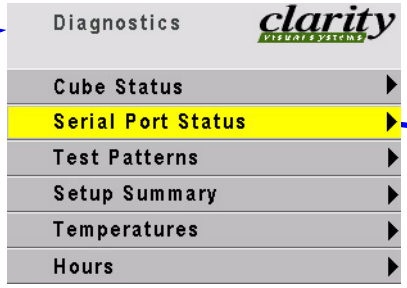


Mode ID: Each mode has a number, and this is the number of the one used now. For XGA, for instance, there are several, each with a different vertical frequency, number of active lines, total number of lines.

Last Fault: Shows the last event that caused the lamps to go off and the elapsed system time (not clock time) in hours:minutes since that happened. Time is in 5 minute increments and does not update while the menu is open.

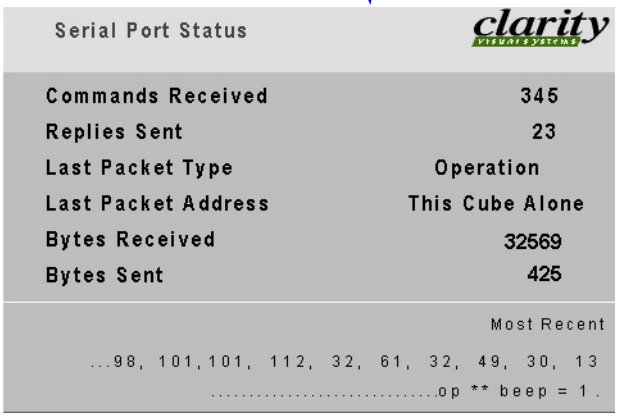
Diagnostics: Serial Status





Commands Received is the number of commands that have passed through *this* Puma, whether or not they were addressed to it.
Replies Sent is the number of replies *this* cube sent.
Last Packet Type will be, most commonly, an Event or an Operation. You might also see Bad CRC or Bad Header if the packet were sent incorrectly.
Last Packet Address might be:

- Global—a command meant for all cubes or a command meant for a group of which this cube is a member, such as a command addressed to 3* when this cube's group ID = 3.
- Not This Cube—a command meant for one or more other cubes in this circuit, but not this one, such as addressed to 45 or 4* or *6 when this cube's ID is 37.
- This Cube Alone—a command address exclusively to this cube, such as addressed to 37 and this cube's ID is 37.
- Not Addressed—direct; a command with no address

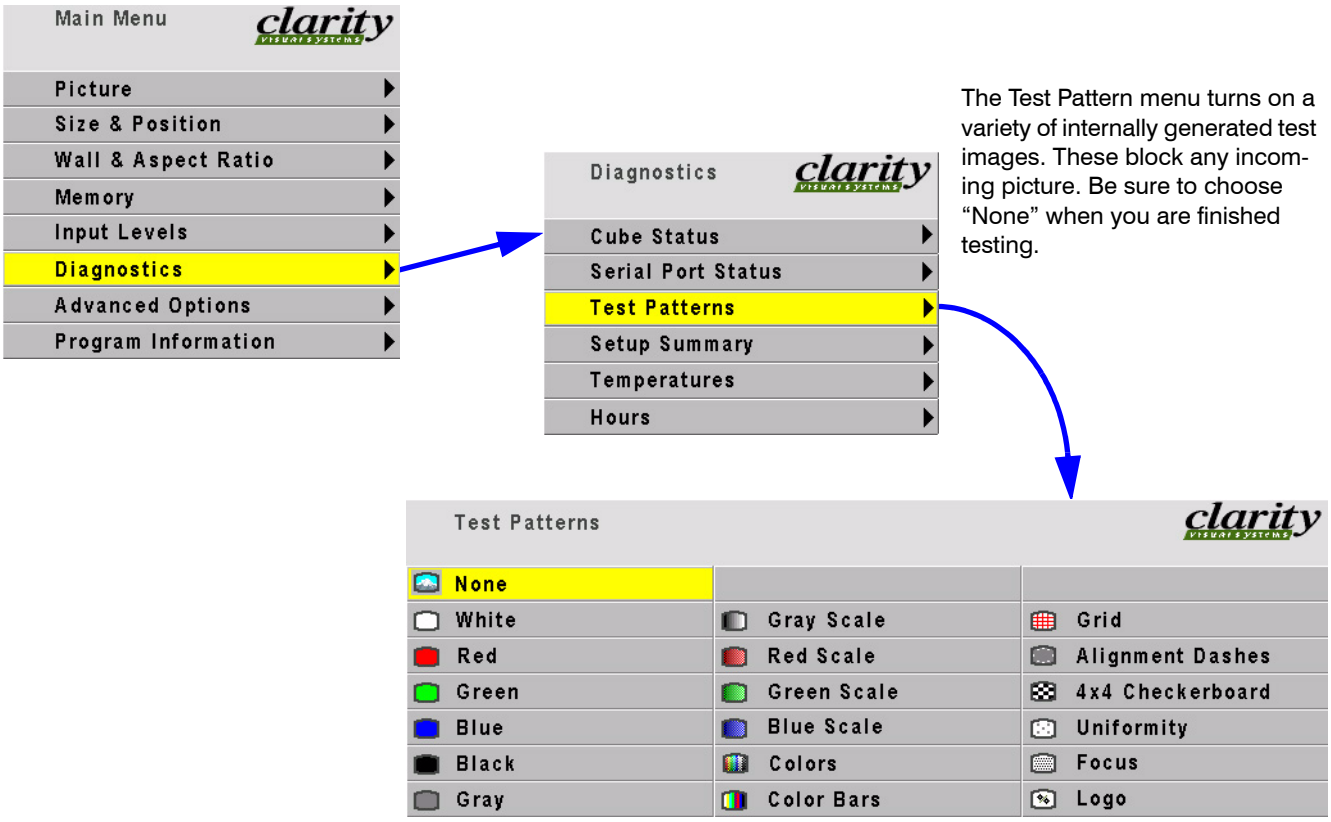


Bytes Received counts bytes received whether addressed to this cube or not.
Bytes Sent counts bytes this cube sent out.

Most Recent shows the last several bytes (decimal equivalent of the ascii hex value) and the actual text of all commands received by this cube, whether addressed to it or not. It does not show bytes or text sent.

Press MONITOR twice to open the Serial Port Status menu.

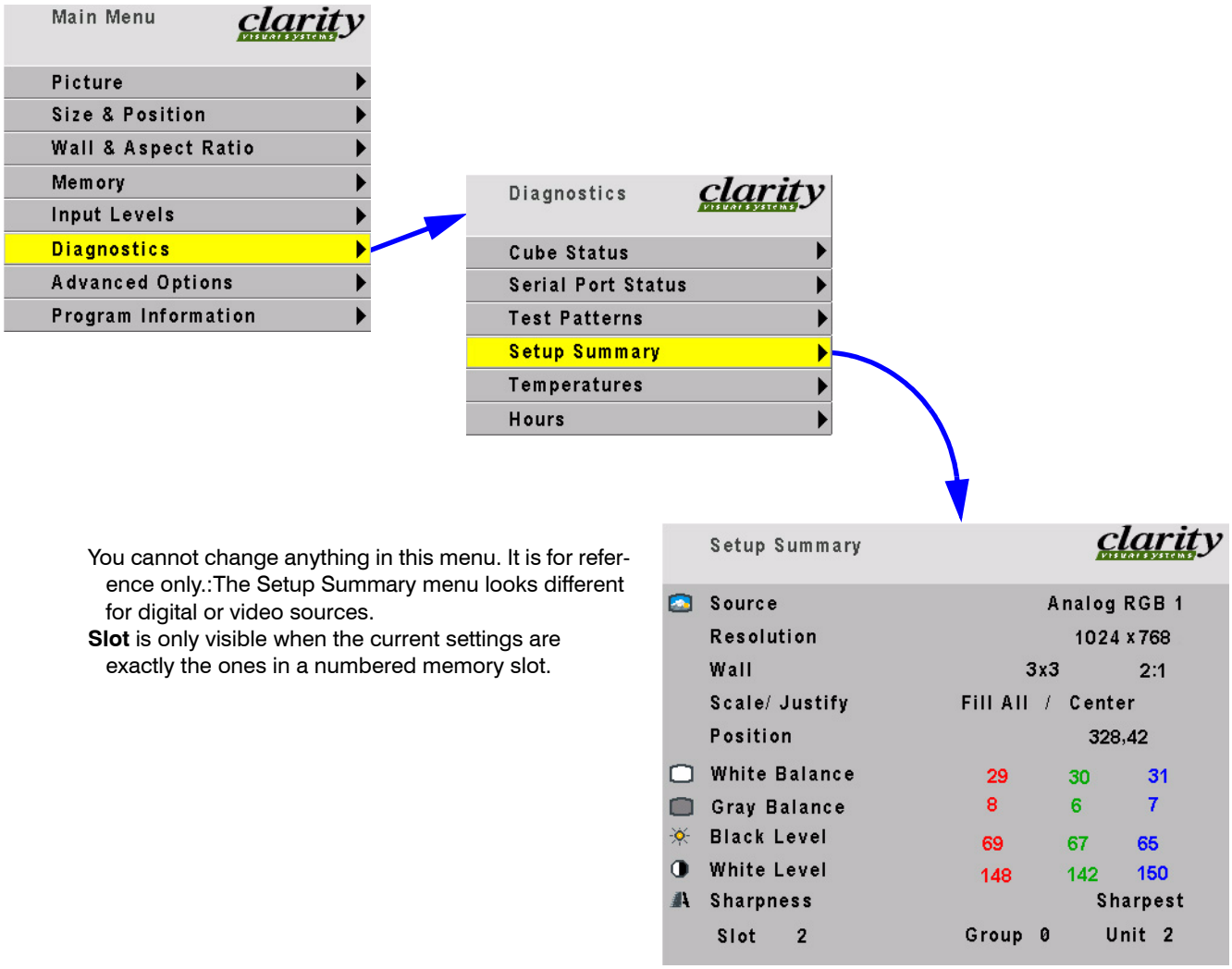
Diagnostics: Test Patterns



The Test Pattern menu turns on a variety of internally generated test images. These block any incoming picture. Be sure to choose “None” when you are finished testing.

Press MONITOR three times to open the Test Patterns menu.

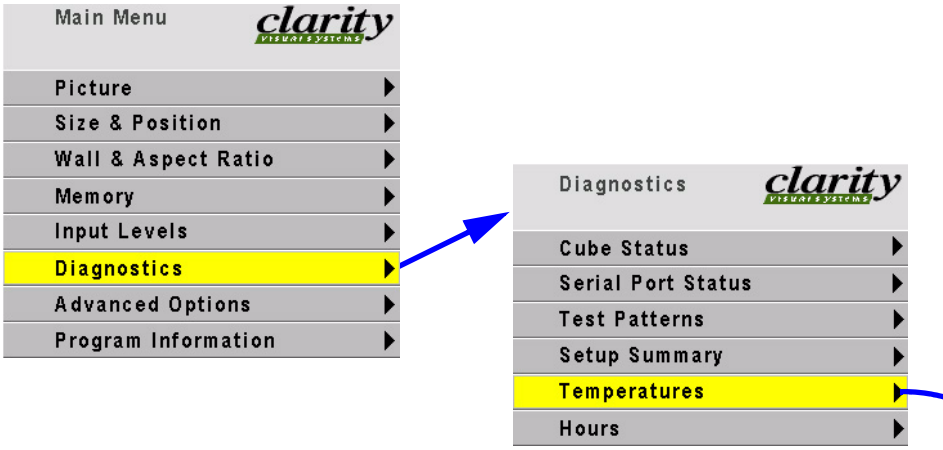
Diagnostics: Setup Summary



You cannot change anything in this menu. It is for reference only.:The Setup Summary menu looks different for digital or video sources.

Slot is only visible when the current settings are exactly the ones in a numbered memory slot.

Diagnostics: Temperature

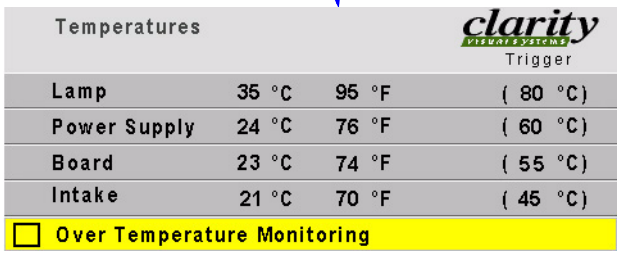


The temperatures come from sensors on the electronics module circuit board, on the power supply circuit board, near the lamps and near the air intake. The lamps are hotter than indicated in this menu. Note also that the maximum intake air temperature in the specifications is 35° C, 95° F

The temperature will appear in gray when the it is well below the trigger temperature, in yellow when it is within 10° of the trigger, and in red when it is over the trigger. If any temperature is over the trigger *and* Over Temperature Monitoring is checked, the lamps will go off.

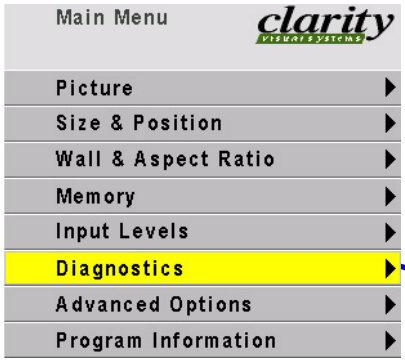
If **(old)** appears between the temperature and the trigger, the temperature data has not been obtained for more than 3 seconds. The lamps may be striking or the sensor failed to answer a query.

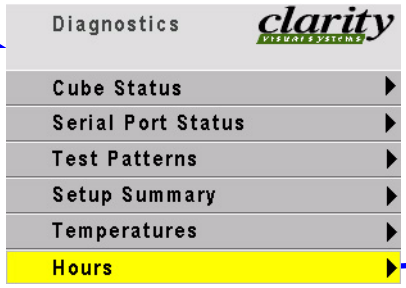
If the sensor has failed, not temperature data will appear, but the Trigger will still be


Temperatures
clarity
Trigger
Lamp 35 °C 95 °F (80 °C)
Power Supply 24 °C 76 °F (60 °C)
Board 23 °C 74 °F (55 °C)
Intake 21 °C 70 °F (45 °C)
Over Temperature Monitoring

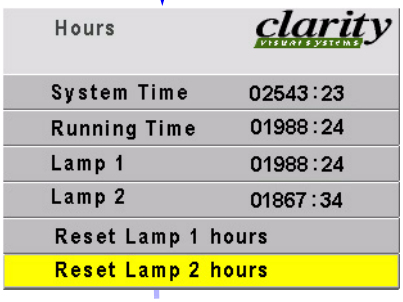
When **Shutdown on Over Temperature** is checked and any temperature reaching its trigger point, the lamps will shut off.

Diagnostics: Hours



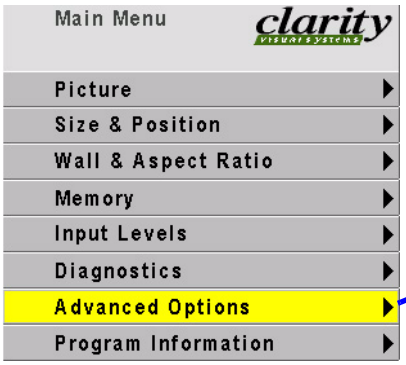


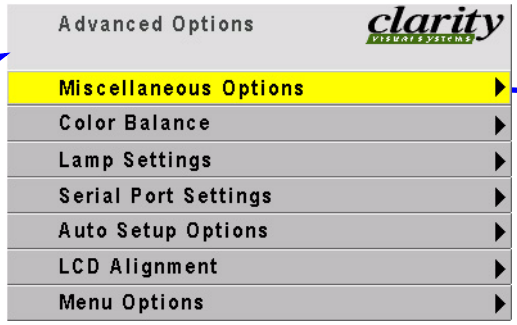
System Time is the number of hours and minutes the electronics module has been running, how long it has had power applied to it.
Running Time is the amount of time the optics have had *any* lamp on, that is, how long light has gone through the optical parts of the Puma. This time is greater than or equal to the longer lamp time.
Lamp 1 and **2** is supposed to be the amount of time the lamp has been on, but it may be only the amount of time since this meter was last reset.



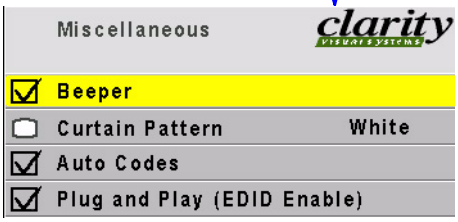
To reset lamp hours, select one of the resets, press ENTER, press the left arrow, press ENTER again.

Advanced Options: Miscellaneous Options





Beeper turns on a beep sound every time a remote button is pressed. The Puma will always beep on a few remote commands, such as Lamp on/off, even when the Beeper is not checked. Puma will always *triple beep* when a remote button asks it to do something it cannot do, such as turn on the lamps when they are already on, or turn on the lamps during lockout. Puma does not beeps on RS232 commands.



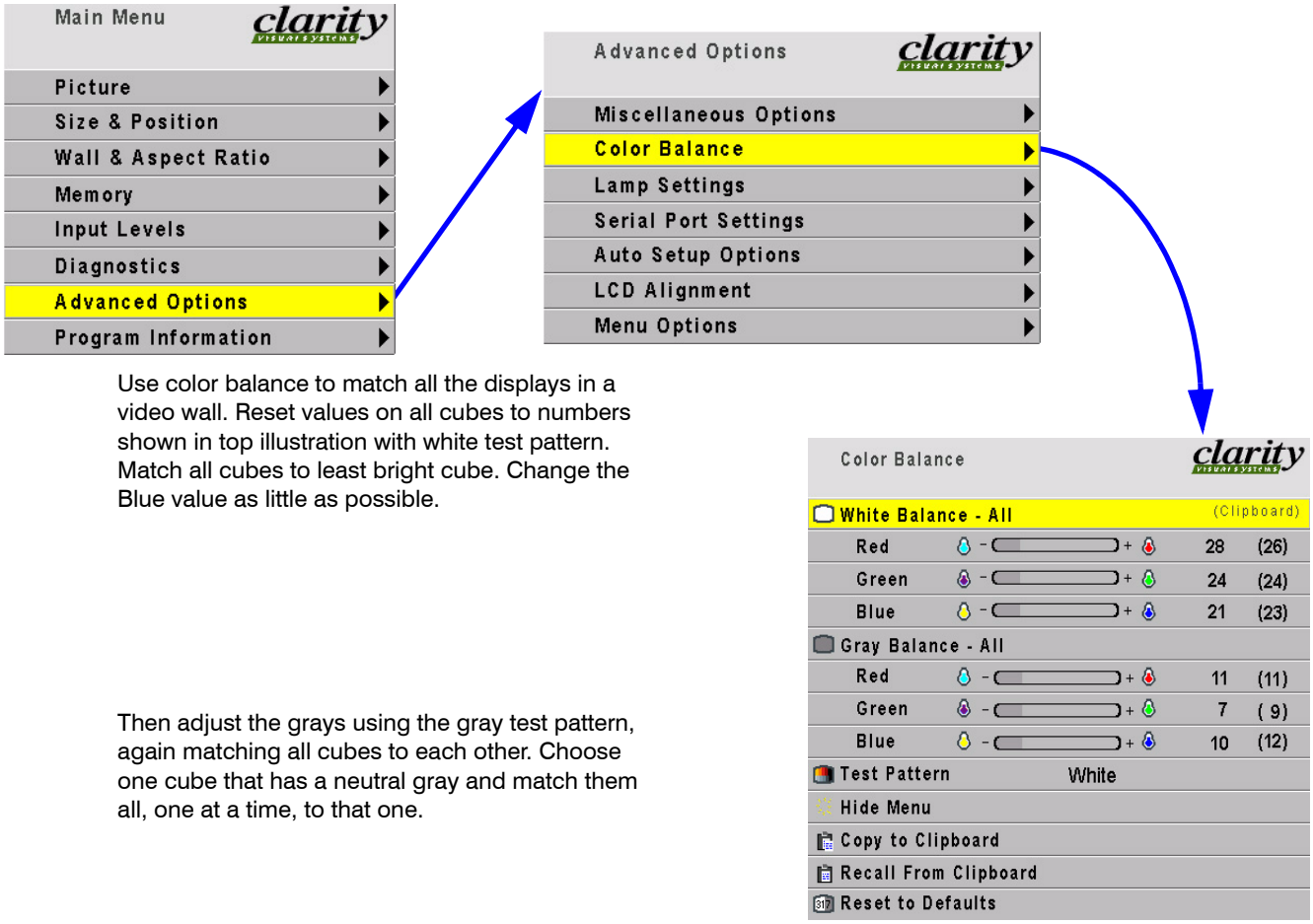
Curtain Pattern is a choice of any of the solid color test patterns or the logo. This is displayed when you press CURTAIN.

Auto Codes checked means the Puma will immediately display the On-Screen codes (red and amber lights on the screen) if the lamps go out due to a fault, such as “Rear panel open.”

Plug and Play enables ????

Press MISC **once** to open the **Miscellaneous** menu.

Advanced Options: Color Balance

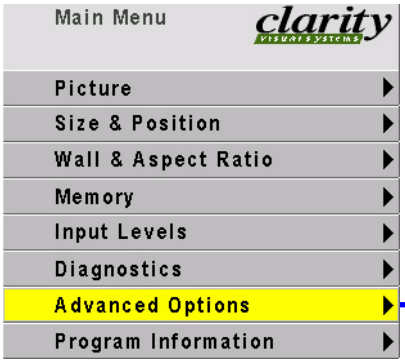


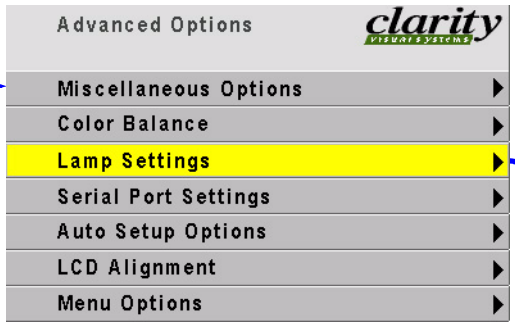
Use color balance to match all the displays in a video wall. Reset values on all cubes to numbers shown in top illustration with white test pattern. Match all cubes to least bright cube. Change the Blue value as little as possible.

Then adjust the grays using the gray test pattern, again matching all cubes to each other. Choose one cube that has a neutral gray and match them all, one at a time, to that one.

Press MISC **twice** to open the **Color Balance menu**.

Advanced Options: Lamp Settings



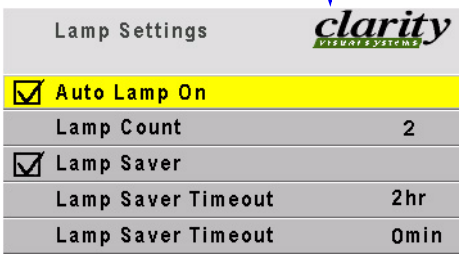


Auto Lamp On, when checked, turns on the lamp shortly after AC power is restored. When not checked, the Puma waits for a Lamp On command from the remote or from RS232.

Lamp Count determines how many lamps will be on.

CAUTION

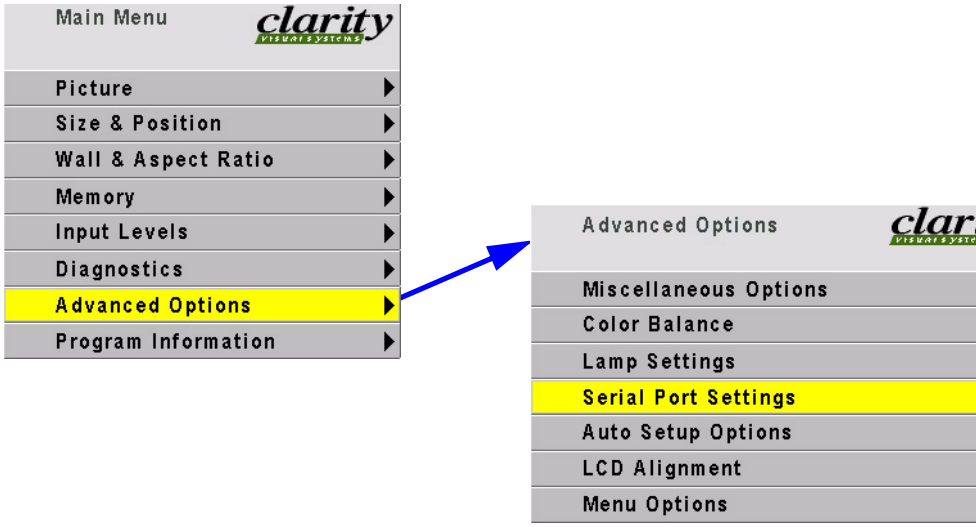
Do not change the Lamp count rapidly. Lamps must cool down for about one minute before lighting the again. A rapid on-off-on sequence may reduce lamp life. Also, lamps should be allowed to heat up for at least five minutes before turning them off.



Lamp Saver causes the lamps to go off if the source is absent for the specified length of time. When shut down starts, Puma displays the message below.

Press MISC three times to open the Lamp Settings menu.

Advanced Options: Serial Port Settings



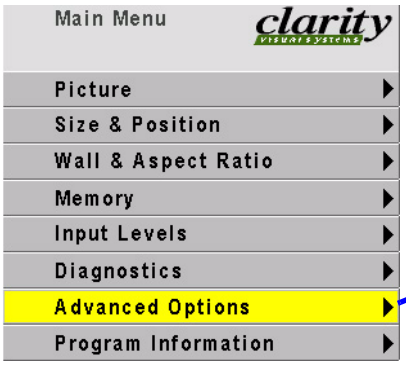
Group ID can be 0-9, A-Z (caps only)
Unit ID can be 0-9, A-Z (caps only) In combination this gives 1296 unique IDs.

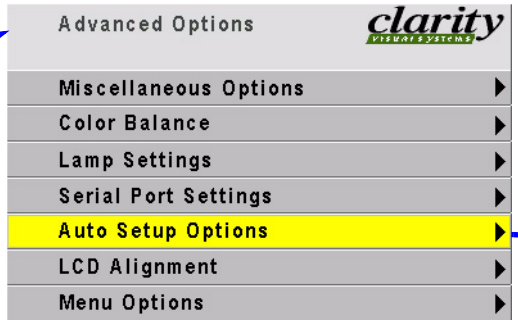
✎ The **ID** is the identification of the individual cube. The **address** is the part of an RS232 that specifies which cube or cubes should execute the command. Put another way, the ID is the number on your house; the address is the number on the envelope that tells the letter carrier where to take it.

ASCII Response Type determines whether the response comes back as text (Symbolic) or an command numbers with the cube ID (Numeric) or with the numeric data only (Data)
ASCII Response Terminator determines what non-printing character(s) are sent at the end of each message. CR=carriage return; LF=line feed
Baud Rate is 2400, 4800, 9600, or 19200.

Press MISC four times to open the Serial Port Settings menu.

Advanced Options: Auto Setup Options

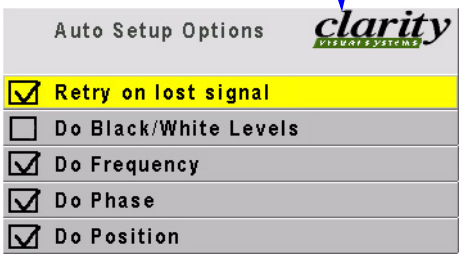




The checked events occur when
- the input changes, say from XGA to UXGA
- a new source is selected
- you press the SOURCE button.

Retry on lost signal, when checked, means the Puma will look for a valid picture on the other connectors whenever sync on the current connector is lost. Puma will stop on the next connector that has a picture (sync).

Do Black/White Levels automatically adjusts the lightest and darkest pixels to be white and black. This fully automatic method is prone to small errors in the white level. Semi-automatic level adjustment is better.

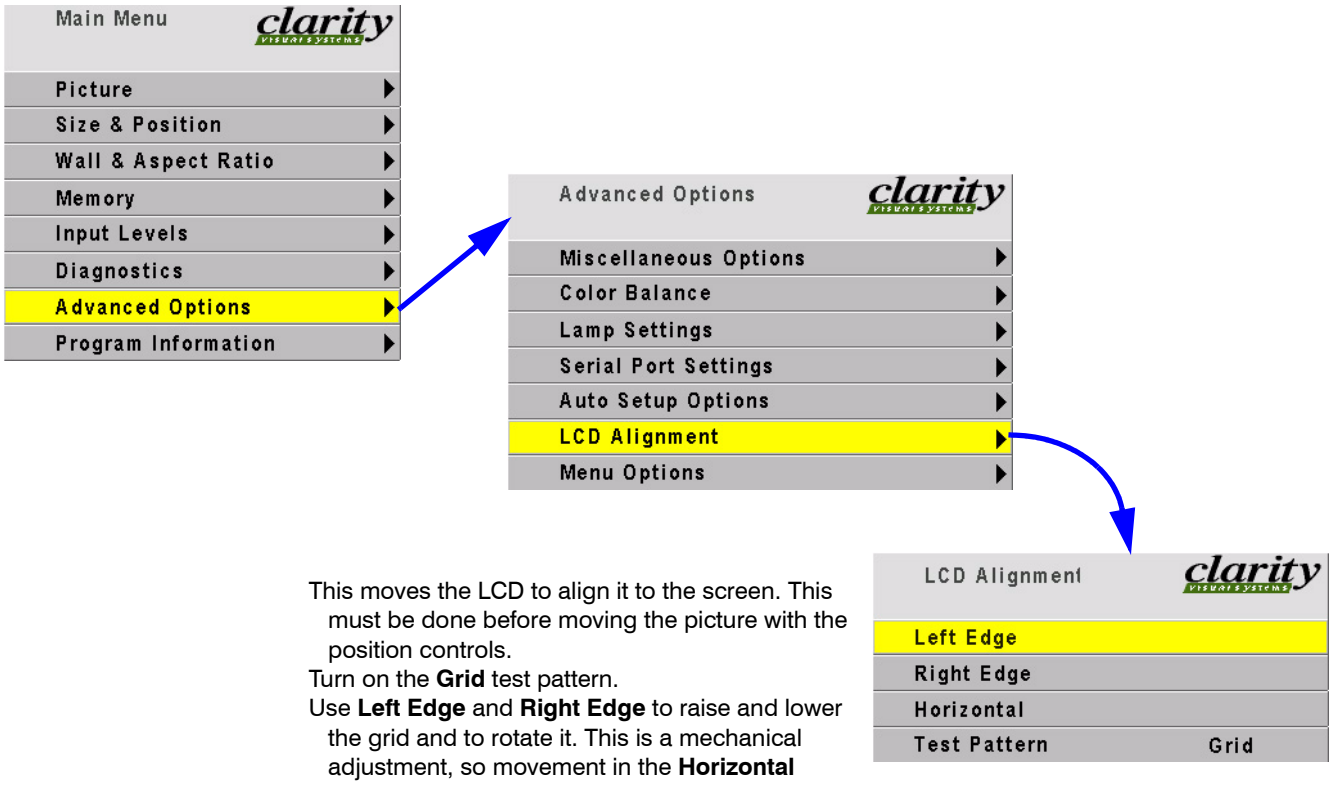


Do Frequency and **Do Phase** automatically adjust the electronics module to the frequency and phase of the selected picture.

Do Position puts the upper left pixel of the picture in the upper left corner of the LCD.

Press MISC five times to open the Auto Setup Options menu.

Advanced Options: LCD Alignment



This moves the LCD to align it to the screen. This must be done before moving the picture with the position controls.

Turn on the **Grid** test pattern.

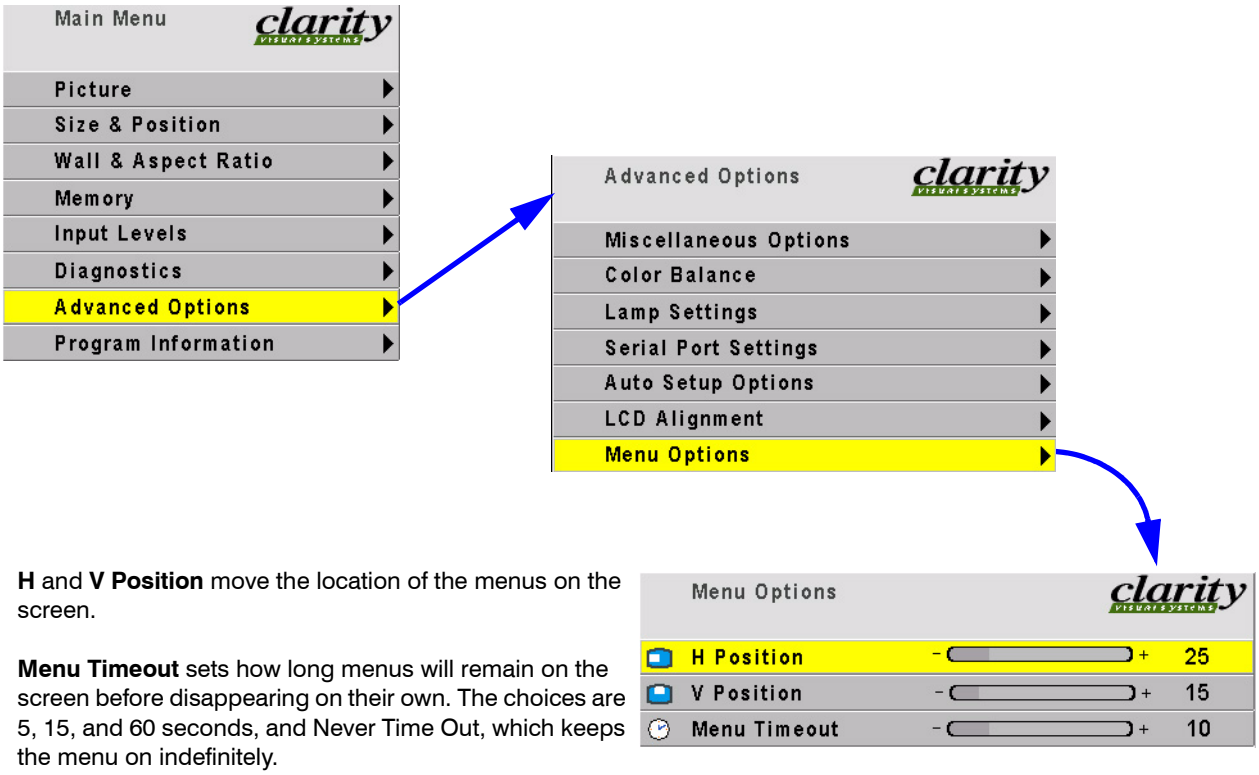
Use **Left Edge** and **Right Edge** to raise and lower the grid and to rotate it. This is a mechanical adjustment, so movement in the **Horizontal** direction may cause slight vertical movement also.

Use the+/– keys to move, up/down to choose.

The **Alignment** test pattern has 6 short dashes around the edges showing the location of the last six pixels rows and columns. Adjust the LCD to hide 2 pixels at each edge. This will make adjacent pictures fit together properly.

See “Aligning the LCD, an Important Step” on page 40 for a complete description of this LCD alignment procedure.

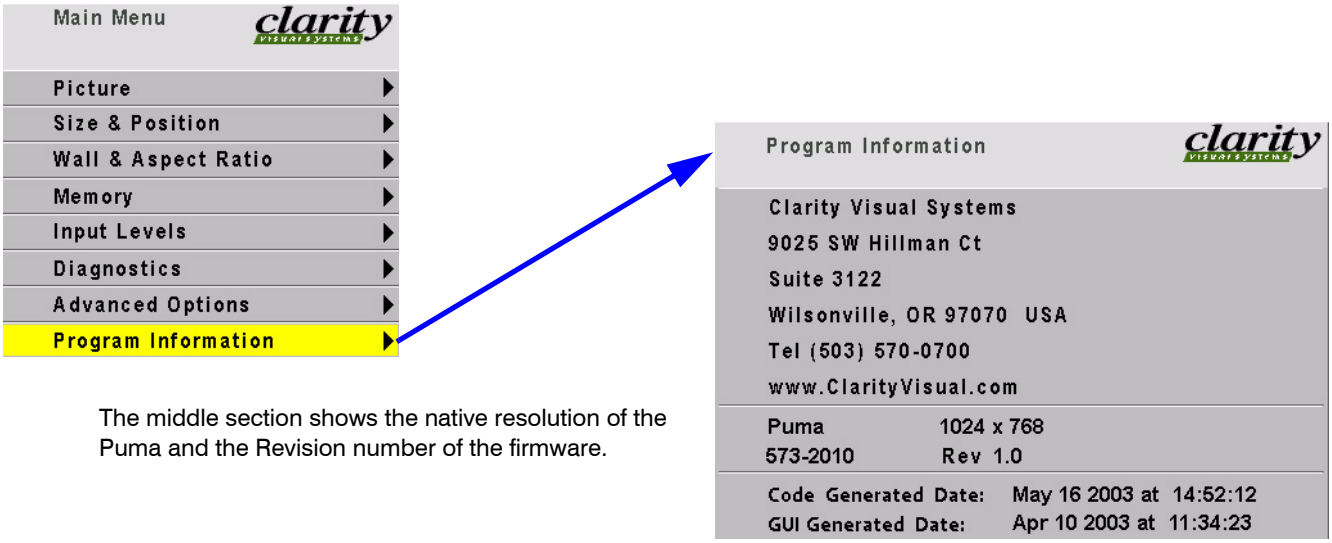
Advanced Options: Menu Options



H and **V Position** move the location of the menus on the screen.

Menu Timeout sets how long menus will remain on the screen before disappearing on their own. The choices are 5, 15, and 60 seconds, and Never Time Out, which keeps the menu on indefinitely.

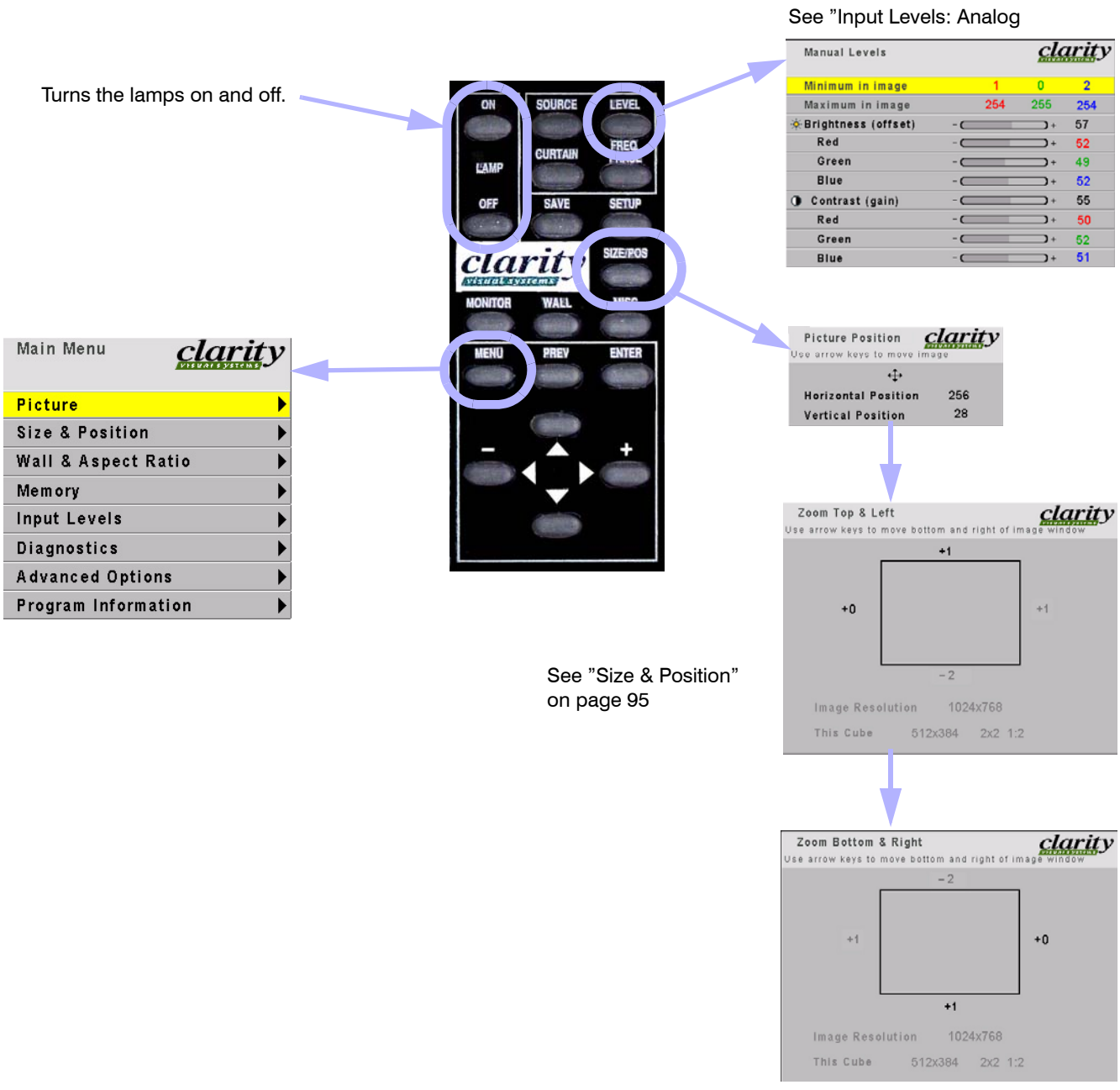
Program Information



The middle section shows the native resolution of the Puma and the Revision number of the firmware.

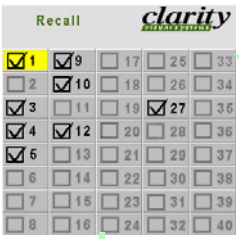
6.2 Remote Control Functions

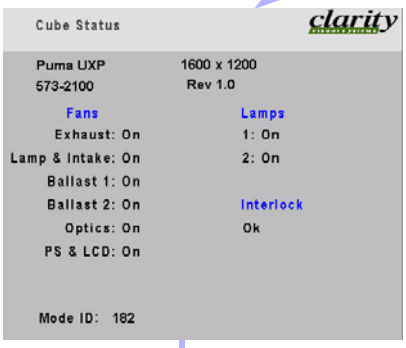
These functions are shown on the next several pages.

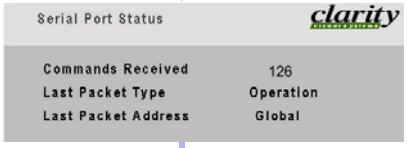


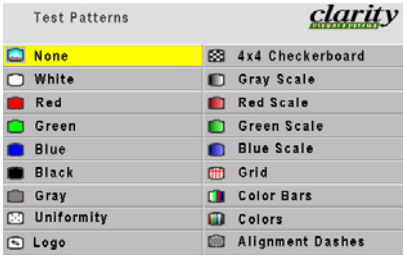
See ”Memory” on page 98

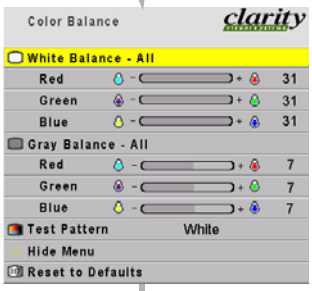
Starts the process of scanning the input connectors for the next available source.

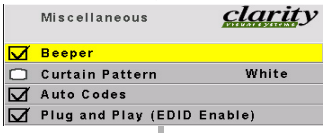


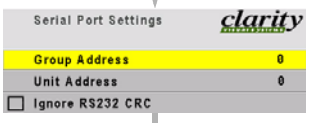


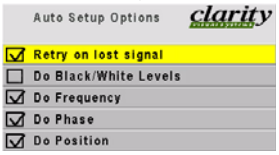








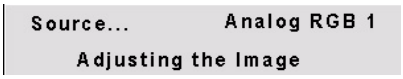




See ”Advanced Options: Miscellaneous Options” on page 110

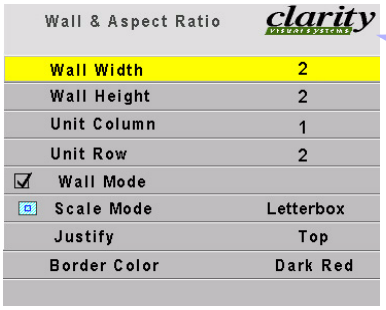
Turns the curtain on and off. Curtain pattern is selected in the Miscellaneous menu.

Displays this message



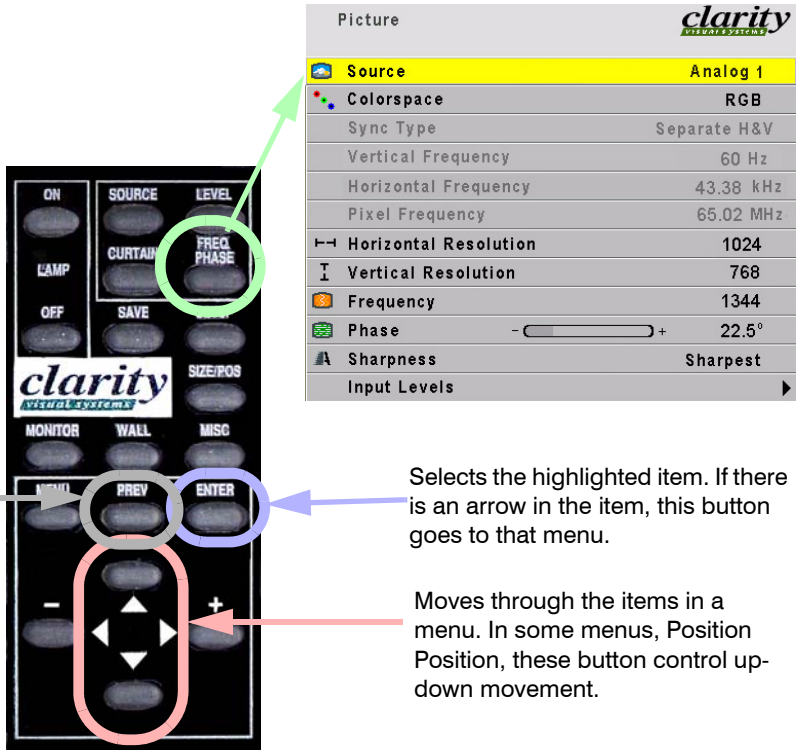
and starts the process of adjusting the image; performs those steps checked in the Auto Setup Options menu

See ”Wall & Aspect Ratio” on page 97



Changes the value of the highlighted item. In some menus, like PIcture Position. these buttons control left-right movement. The + button moves you to the next menu, when there is an arrow in the current highlighted item.

See ”Picture” on page 94



6.3 Analog Mode Tables

Analog Modes in Horizontal Resolution Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
APP0560/APP0560B	12		512	384	60.1	640
APP0560/APP0560B (alt)	12		560	384	60.1	704
PW0660	11		640	200	60.3	896
DMT0685D/DMT0685F (alt)	14		640	350	85.1	832
IBM0770/PW0670 (alt)	17		640	350	70.1	800
NEC0656D	13		640	400	56.4	848
DMT0685D/DMT0685F	14		640	400	85.1	832
IBM0770/PW0670 (alt)	17		640	400	70.1	800
IBM0660/IBM0660D (alt)	19		640	400	59.6	824
DMT0675	18		640	480	75	840
IBM0660/IBM0660D	19		640	480	59.6	826
DMT0685	20		640	480	85	832
DMT0672	21		640	480	72.8	832
IBM0675	22		640	480	75	800
APP0667/APP0667_	23		640	480	66.6	864
VGA	24		640	480	61.2	850
EIA0729X/EIA0629/480i_/4 (alt)	0	Yes	640	480	30	780
ITU0925X/ITU0725K/ITU072 (alt)	1	Yes	640	480	25	944
APP0667/APP0667_ (alt)	23		640	480	66.6	896
SMT0760/480p/480SH/480p_ (alt)	25		640	480	59.9	800
SMT0760/480p/480SH/480p_ (alt)	25		640	480	59.9	780
APP06750	67		640	870	75	832
IBM0770/PW0670 (alt)	17		720	350	70.1	900
DMT0785H	15		720	400	85.1	936
XGA2	16		720	400	87.9	900
IBM0770/PW0670	17		720	400	70.1	900
SMT0760/480p/480SH/480p_	25		720	480	59.9	900
PW0759	27		720	480	59.4	935
EIA0729X/EIA0629/480i_/4 (alt)	0	Yes	720	480	30	858
SMT0760/480p/480SH/480p_ (alt)	25		720	480	59.9	858
PW0775	28		720	576	75	944
EIA0729X/EIA0629/480i_/4	0	Yes	752	484	30	910
ITU0925X/ITU0725K/ITU072 (alt)	1	Yes	768	574	25	944
DMT8075	29		800	600	75	1056
DMT0856	30		800	600	56.3	1024

Analog Modes in Horizontal Resolution Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
PW0872	31		800	600	72	1040
DMT0860	32		800	600	60.3	1056
PW0880	33		800	600	80	1056
DMT8085	34		800	600	85.1	1048
PW0890	35		800	600	90	1056
PW08100	36		800	600	100	1072
PW08110	37		800	600	110	1072
PW08120	38		800	600	120	1088
DMT0872	40		800	600	72.2	1040
APP0875	39		832	624	75.1	1120
PW0860	26		852	480	60	1072
ITU0925X/ITU0725K/ITU072	1	Yes	920	574	25	1136
PW0985	41		960	720	85	1248
PW0975	42		960	720	75	1248
PW0960	43		960	720	60	1248
HWP1060	45		1024	768	60	1344
DMT1075	46		1024	768	75	1312
PW1072	47		1024	768	72	1360
HWP1075_	48		1024	768	75	1328
PW1080	49		1024	768	80	1376
APP1075	50		1024	768	74.9	1328
IBM1070	51		1024	768	70	1368
SUN1077	52		1024	768	77.1	1360
IBM1076	53		1024	768	75.8	1408
SNY1072	54		1024	768	71.8	1296
DMT1070	55		1024	768	70.1	1328
DMT1060_1	56		1024	768	60	1344
DMT1085	57		1024	768	85	1376
PW1090	58		1024	768	90	1376
APP1059	59		1024	768	59.3	1328
PW10100	60		1024	768	100	1392
DMT1043	3	Yes	1024	768	43.5	1264
PW10110	61		1024	768	110	1392
HWP1075	62		1024	768	75	1344
SUN1061Q	78		1024	1024	61.4	1424
1024i	7	Yes	1024	1024	30.1	1320
IBM1060Q/IBM1260G/HWP126 (alt)	74		1024	1024	60	1408
IBM1043	2	Yes	1053	754	43.5	1286

Analog Modes in Horizontal Resolution Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
IBM1043_	4	Yes	1056	768	43.5	1280
NEC1140B	5	Yes	1120	750	40	1456
DMT1175	63		1152	864	75	1600
DMT1185	64		1152	864	85	1576
DMT1170	65		1152	864	70	1480
APP1175	66		1152	870	75.1	1456
SUN1166X/1166_	68		1152	900	66	1504
SUN1176X/1176_	69		1152	900	76.1	1472
SUN1166X/1166_ (alt)	68		1152	900	66	1528
SUN1176X/1176_ (alt)	69		1152	900	76.1	1504
720p59/720p60	44		1280	720	60	1650
DMT1275A	70		1280	960	75	1680
DMT1260A	71		1280	960	60	1800
DMT1285A	72		1280	960	85	1728
IBM1267G/IBM1267_	73		1280	1024	67	1696
IBM1060Q/IBM1260G/HWP126	74		1280	1024	60	1760
PW1660_1	77		1280	1024	60	1712
SNY1274G	79		1280	1024	74.1	1712
VSC1260G	80		1280	1024	60	1688
SUN1276G/SNY1276G	81		1280	1024	76.1	1664
DMT1275G/HWP1275G	82		1280	1024	75	1688
DMT1260G/PW1460	83		1280	1024	60.1	1688
PW1272	84		1280	1024	72	1728
DMT1243G	6	Yes	1280	1024	43.4	1696
DMT1285G	85		1280	1024	85	1728
PW1280	86		1280	1024	80	1744
SUN1267G/1267_	87		1280	1024	66.7	1648
HWP1272G	90		1280	1024	72	1728
IBM1060Q/IBM1260G/HWP126 (alt)	74		1280	1024	60	1708
SUN1276G/SNY1276G (alt)	81		1280	1024	76.1	1724
SUN1267G/1267_ (alt)	87		1280	1024	66.7	1632
IBM1352	8	Yes	1360	1024	51.5	1824
DMT1260G/PW1460 (alt)	83		1400	1050	60.1	1688
VSC1660V/VSC1460/VSC1960 (alt)	91		1440	1080	60	1936
DMT1660	104		1600	1200	60	2160
DMT1648	10	Yes	1600	1200	48	2160
VSC1660V/VSC1460/VSC1960	91		1680	1080	60	2256
1080i29	9	Yes	1920	1080	30	2200

Analog Modes in Horizontal Resolution Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
r1080p60/r1080p59	92		1920	1080	60	2200
1080p30	93		1920	1080	30	2200
r1080p24	94		1920	1080	24	2750
PW1960	97		1920	1200	60	2112
PW1955	98		1920	1200	55	2112
PW2046	118		2048	1536	46	2240
PW2040	119		2048	1536	40	2240

Analog Modes in Mode ID Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
EIA0729X/EIA0629/480i_/4 (alt)	0	Yes	640	480	30	780
EIA0729X/EIA0629/480i_/4 (alt)	0	Yes	720	480	30	858
EIA0729X/EIA0629/480i_/4	0	Yes	752	484	30	910
ITU0925X/ITU0725K/ITU072 (alt)	1	Yes	640	480	25	944
ITU0925X/ITU0725K/ITU072 (alt)	1	Yes	768	574	25	944
ITU0925X/ITU0725K/ITU072	1	Yes	920	574	25	1136
IBM1043	2	Yes	1053	754	43.5	1286
DMT1043	3	Yes	1024	768	43.5	1264
IBM1043_	4	Yes	1056	768	43.5	1280
NEC1140B	5	Yes	1120	750	40	1456
DMT1243G	6	Yes	1280	1024	43.4	1696
1024i	7	Yes	1024	1024	30.1	1320
IBM1352	8	Yes	1360	1024	51.5	1824
1080i29	9	Yes	1920	1080	30	2200
DMT1648	10	Yes	1600	1200	48	2160
PW0660	11		640	200	60.3	896
APP0560/APP0560B	12		512	384	60.1	640
APP0560/APP0560B (alt)	12		560	384	60.1	704
NEC0656D	13		640	400	56.4	848
DMT0685D/DMT0685F (alt)	14		640	350	85.1	832
DMT0685D/DMT0685F	14		640	400	85.1	832
DMT0785H	15		720	400	85.1	936
XGA2	16		720	400	87.9	900
IBM0770/PW0670 (alt)	17		640	350	70.1	800
IBM0770/PW0670 (alt)	17		640	400	70.1	800
IBM0770/PW0670 (alt)	17		720	350	70.1	900
IBM0770/PW0670	17		720	400	70.1	900

Analog Modes in Mode ID Order

Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
DMT0675	18		640	480	75	840
IBM0660/IBM0660D (alt)	19		640	400	59.6	824
IBM0660/IBM0660D	19		640	480	59.6	826
DMT0685	20		640	480	85	832
DMT0672	21		640	480	72.8	832
IBM0675	22		640	480	75	800
APP0667/APP0667_	23		640	480	66.6	864
APP0667/APP0667_ (alt)	23		640	480	66.6	896
VGA	24		640	480	61.2	850
SMT0760/480p/480SH/480p_ (alt)	25		640	480	59.9	800
SMT0760/480p/480SH/480p_ (alt)	25		640	480	59.9	780
SMT0760/480p/480SH/480p_	25		720	480	59.9	900
SMT0760/480p/480SH/480p_ (alt)	25		720	480	59.9	858
PW0860	26		852	480	60	1072
PW0759	27		720	480	59.4	935
PW0775	28		720	576	75	944
DMT8075	29		800	600	75	1056
DMT0856	30		800	600	56.3	1024
PW0872	31		800	600	72	1040
DMT0860	32		800	600	60.3	1056
PW0880	33		800	600	80	1056
DMT8085	34		800	600	85.1	1048
PW0890	35		800	600	90	1056
PW08100	36		800	600	100	1072
PW08110	37		800	600	110	1072
PW08120	38		800	600	120	1088
APP0875	39		832	624	75.1	1120
DMT0872	40		800	600	72.2	1040
PW0985	41		960	720	85	1248
PW0975	42		960	720	75	1248
PW0960	43		960	720	60	1248
720p59/720p60	44		1280	720	60	1650
HWP1060	45		1024	768	60	1344
DMT1075	46		1024	768	75	1312
PW1072	47		1024	768	72	1360
HWP1075_	48		1024	768	75	1328
PW1080	49		1024	768	80	1376
APP1075	50		1024	768	74.9	1328

Analog Modes in Mode ID Order

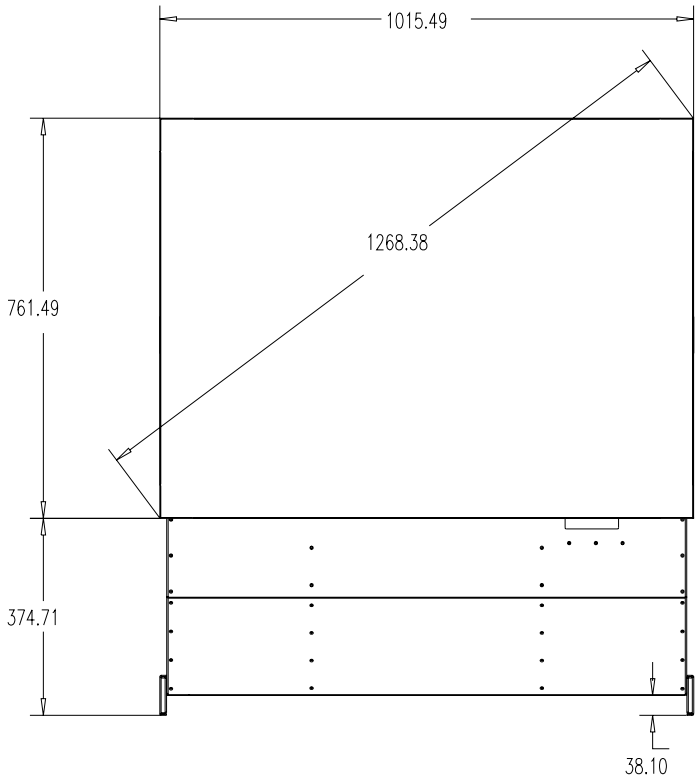
Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
IBM1070	51		1024	768	70	1368
SUN1077	52		1024	768	77.1	1360
IBM1076	53		1024	768	75.8	1408
SNY1072	54		1024	768	71.8	1296
DMT1070	55		1024	768	70.1	1328
DMT1060_1	56		1024	768	60	1344
DMT1085	57		1024	768	85	1376
PW1090	58		1024	768	90	1376
APP1059	59		1024	768	59.3	1328
PW10100	60		1024	768	100	1392
PW10110	61		1024	768	110	1392
HWP1075	62		1024	768	75	1344
DMT1175	63		1152	864	75	1600
DMT1185	64		1152	864	85	1576
DMT1170	65		1152	864	70	1480
APP1175	66		1152	870	75.1	1456
APP06750	67		640	870	75	832
SUN1166X/1166_	68		1152	900	66	1504
SUN1166X/1166_ (alt)	68		1152	900	66	1528
SUN1176X/1176_	69		1152	900	76.1	1472
SUN1176X/1176_ (alt)	69		1152	900	76.1	1504
DMT1275A	70		1280	960	75	1680
DMT1260A	71		1280	960	60	1800
DMT1285A	72		1280	960	85	1728
IBM1267G/IBM1267_	73		1280	1024	67	1696
IBM1060Q/IBM1260G/HWP126 (alt)	74		1024	1024	60	1408
IBM1060Q/IBM1260G/HWP126	74		1280	1024	60	1760
IBM1060Q/IBM1260G/HWP126 (alt)	74		1280	1024	60	1708
PW1660_1	77		1280	1024	60	1712
SUN1061Q	78		1024	1024	61.4	1424
SNY1274G	79		1280	1024	74.1	1712
VSC1260G	80		1280	1024	60	1688
SUN1276G/SNY1276G	81		1280	1024	76.1	1664
SUN1276G/SNY1276G (alt)	81		1280	1024	76.1	1724
DMT1275G/HWP1275G	82		1280	1024	75	1688
DMT1260G/PW1460	83		1280	1024	60.1	1688
DMT1260G/PW1460 (alt)	83		1400	1050	60.1	1688
PW1272	84		1280	1024	72	1728

Analog Modes in Mode ID Order

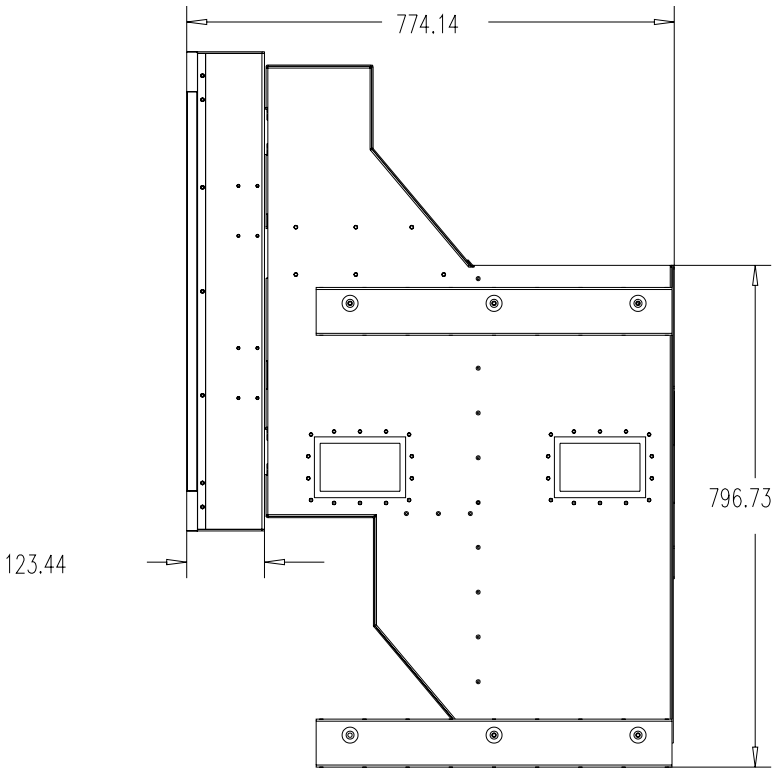
Mode Name	Mode ID	Interlace	Horiz Res	Vert Res	V Freq (Hz)	Total H Pixels
DMT1285G	85		1280	1024	85	1728
PW1280	86		1280	1024	80	1744
SUN1267G/1267_	87		1280	1024	66.7	1648
SUN1267G/1267_ (alt)	87		1280	1024	66.7	1632
HWP1272G	90		1280	1024	72	1728
VSC1660V/VSC1460/VSC1960 (alt)	91		1440	1080	60	1936
VSC1660V/VSC1460/VSC1960	91		1680	1080	60	2256
r1080p60/r1080p59	92		1920	1080	60	2200
1080p30	93		1920	1080	30	2200
r1080p24	94		1920	1080	24	2750
PW1960	97		1920	1200	60	2112
PW1955	98		1920	1200	55	2112
DMT1660	104		1600	1200	60	2160
PW2046	118		2048	1536	46	2240
PW2040	119		2048	1536	40	2240

6.4 Puma Drawings

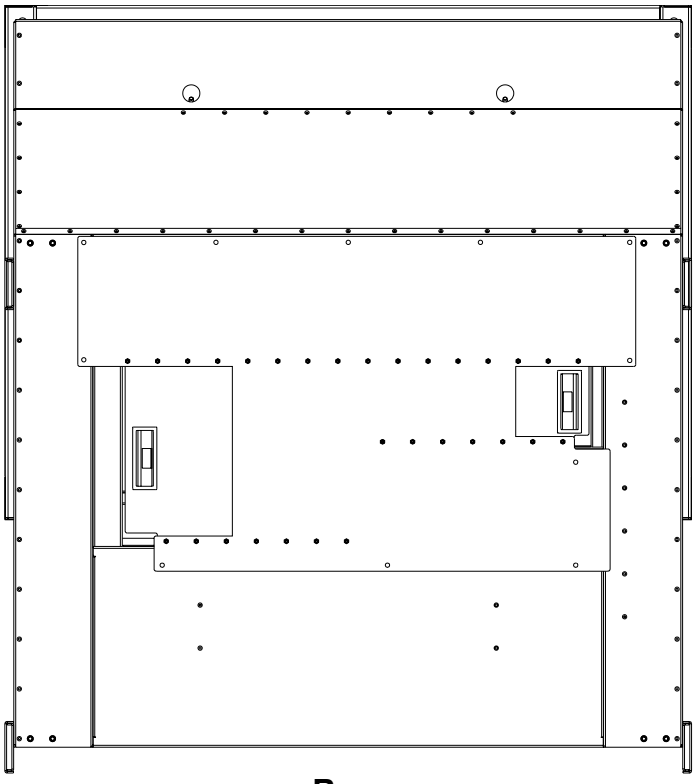
Dimensions in millimeters



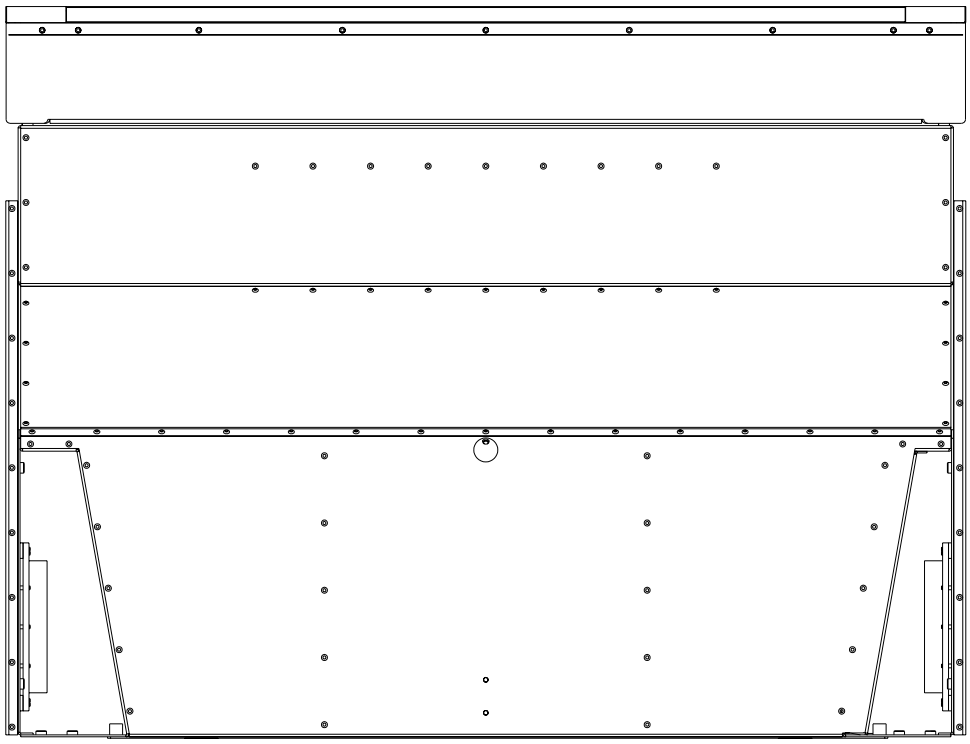
Front



Side



Rear



Top

6.5 Connector Wiring

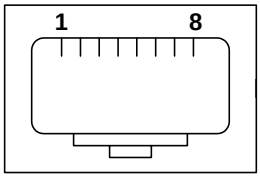
These are connector diagrams with pin designations. All connectors on these pages are shown looking at them from the outside, not from the solder side. These diagrams look at the outside of the connector, as the cable sees it, not the wiring side.

RS232 adapter

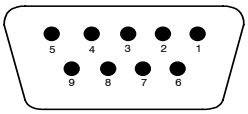
The wiring shown for this adapter is correct for *straight-thru* network cables.

Yellow wire	pin 3
Black wire	pin 2
Green wire	pin 5

RJ45	9-pin
6	3
5	5
3	2



RJ45 looking into the socket.

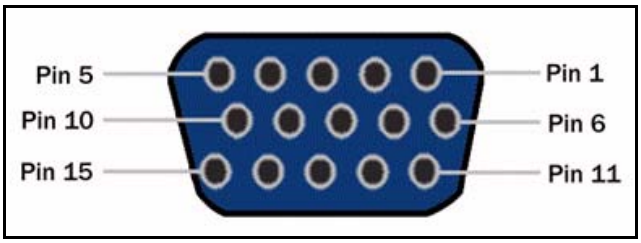


This little 9-pin to RJ45 adapter is available unwired from many computer or electronic stores. Get one with a female 9-pin connector.

The RS232 cable **must** be wired straight-thru. You can tell if a cable is wired straight-thru by looking at its two ends side-by-side.

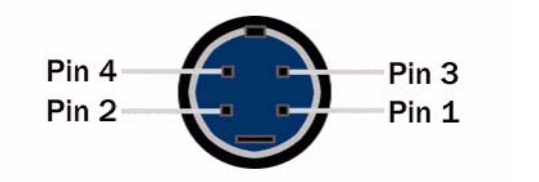
1. Hold the cable ends next to each other, both ends pointing away from you. Have the clips on both connectors pointing down so you can't see them.
2. If the color of the wires on the two connectors is the same, left to right, the cable is straight-thru. The order of the colors doesn't matter, as long as they are both the same.

DB15 standard VGA connector



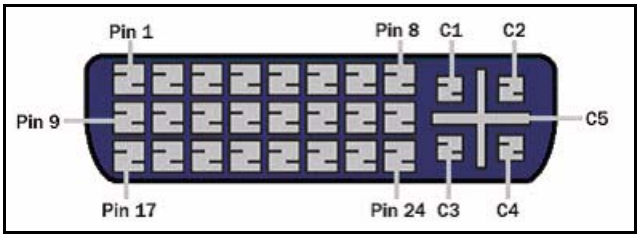
Pin	Signal
1	Analog Red Out
2	Analog Green Out
3	Analog Blue Out
4	Not connected
5	Ground
6	Ground
7	Ground
8	Ground
9	+5V (DDC)
10	Ground
11	Not connected
12	SDA (DDC)
13	TTL Horizontal Sync
14	TTL Vertical Sync
15	SCL (DDC)

S-Video connector



Pin	Signal
1	Ground (luminance)
2	Ground (chrominance)
3	Luminance 1 V including sync 75 ohms
4	Chrominance 0.3 V burst 75 ohms

DVI-I connector



Pin	Signal	Pin	Signal
1	TMDS data 2-	13	TMDS data 3+
2	TMDS data 2+	14	+5 V power
3	TMDS data 2/4 shield	15	Ground (for +5V, H-sync, V-sync)
4	TMDS data 4–	16	Hot plug detection
5	TMDS data 4+	17	TMDS data 0–
6	DDC clock	18	TMDS data 0+
7	DDC data	19	TMDS data 0/5 shield
8	Analog vertical sync	20	TMDS data 5–
9	TMDS data 1–	21	TMDS data 5+
10	TMDS data 1+	22	TMDS clock shield
11	TMDS data 1/3 shield	23	TMDS clock +
12	TMDS data 3–	24	TMDS clock–
C1	Analog Red	C3	Analog Blue
C2	Analog Green	C4	Analog H sync
C5	Analog ground		

6.6 Regulatory Information

Declaration of Conformity

Manufacturer's Name: **Clarity Visual Systems**
Manufacturer's Address: **9025 SW Hillman Court, Suite 3122**
Wilsonville, Oregon 97070-7708

declares that the products
Model Numbers: **WN-5010-X, WN-5020-XP, WN-5020-UXP (LCD projector)**
Product Options: **All**

conforms to the following EU Directives and the standards stated:

Safety: **UL60950 - Safety of IT Equipment**

Electromagnetic Compatibility Directive 89/336/EEC and amendments

EN 55022/CISPR 22 – Radiate and Conducted Emissions from IT Equipment
EN 50082-1/EN61000-4 – Generic Immunity Standard
Including: EN61000-4-2Electrostatic Discharge
EN61000-4-3Radiated Susceptibility
EN61000-4-4Electrical Fast Transient Burst
EN61000-4-5Surge
EN61000-4-6Conducted Susceptibility
EN610004-11Voltage Dips & Interrupts

FCC Regulations
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate receiving antenna.
- Increase separation between equipment and receiver.
- Connect equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician.

Note: Any changes or modifications to the display not expressly approved by Clarity Visual could void the user's authority to operate this equipment. Use of a shielded interface cable is required to comply with the Class A limits of Part 15 of FCC rules.

Other Certifications
UL, CUL, FCC/CISPR 22/85, CE

6.7 Meaning of Terms

This table contains the meaning of words as used in this manual.

<table>
<tr><th>Term</th><th>Meaning</th></tr>
<tr><td>aspect ratio</td><td>The ratio of the width to the height of a picture, often expressed as 4-by-3, 4:3, 4×3, or 1.33:1 (the aspect ratio of standard television pictures). 16-by-9 (1.77:1) is the aspect ratio for high-definition TV.
<table>
<tr><th>Clarity Display</th><th>Aspect Ratio</th></tr>
<tr><td>Lion X, UX, XP, UXP, XL, UXL
Panther UX, UXP
Puma X, XP, UXP
Tigress S, X
Wildcat S, SE</td><td>1.33</td></tr>
<tr><td>Lion SX, SXP</td><td>1.25</td></tr>
<tr><td>Bobcat 1, 2</td><td>1.66</td></tr>
<tr><td>Bay Cat, Margay, Bengal</td><td>1.77</td></tr>
</table></td></tr>
<tr><td>ballast</td><td>The electronics part (module) that powers the lamp, providing high voltage to start the lamp and a lower voltage for operation.</td></tr>
<tr><td>Bay Cat</td><td>The name for a Clarity direct-view LCD display, similar to a Clarity Bobcat, but with a larger screen (46”) and higher resolution (1920x1080). Model number SN-4610-1080</td></tr>
<tr><td>big picture</td><td>Clarity’s Big Picture™, a system for spreading a single source picture over a wall or part of a wall of cubes.</td></tr>
<tr><td>big picture key</td><td>The small board that enables the electronics module to make Clarity’s Big Picture™ work.</td></tr>
<tr><td>Bobcat</td><td>The name for any Clarity model beginning SN-4025 or SN-4035. A 40" direct view LCD display of 1280 × 768 pixels.</td></tr>
<tr><td>B-Y</td><td>One of the components of “component” video. See also component video and colorspace.</td></tr>
</table>

Term	Meaning
colorspace	RGB colorspace has red, green and blue components to each color. YPbPr colorspace has a luminance (Y) component, a blue-minus-luminance component (Pb or B-Y), and a red-minus-luminance component (Pr or R-Y). Although both color systems have “components” of the colors, the term “component video” usually refers to YPbPr.
component video	Video information that carried in two or more separate (but synchronized) signals. *See* colorspace.
composite sync	Sync signals that combine the horizontal and vertical syncs onto one signal line, separate from the video. RGBS uses this type.
composite video	A video distribution system in which all the video information, is sent on one wire. Sometimes called C-Video.
cube	One display without regard to others that may be in a wall with it. *See also* unit; display.
C-Video	Composite video; a video distribution system in which all the video information, is sent on one wire.
DA	Distribution amplifier; a device that takes in one input and gives out many of the same type. DAs are available for video, computer and digital signals.
display	One display unit without regard to others that may be in a wall with it. *See also* cube; unit.
DVI	Digital Video Interface, a standard for distributing computer pictures in digital form.

Term	Meaning
electronics module	The electronic part that controls almost everything about the display. It converts incoming pictures to a form the LCD can use to display pictures and provides control through the remote control and RS232 connections to other functions, such as turning lamps on and monitoring fans.
Fast key	One of the buttons on the remote control that takes you directly to a menu or chain of menus.
Fresnel lens	A flat, groove material, often plastic, that performs functions similar to a normal lens. Used extensively in Clarity LCD products. All screens have a Fresnel lens. Named for the French inventor in 19th century and pronounced “fruh-NELL.”
H & V sync	Horizontal and vertical sync on two separate lines. The VGA family uses this type.
key	a push button on the remote control
keystone	An image that is wider at the top or bottom, or taller on the left or right.
lamp life	A lamp life of 5,000 hours means that for a *large* group of lamps, after 5,000 hours of use, *at least* half of them will still be operation.
LED	Light Emitting Diode: a small, low power lamp used as an indicator, often red or green, but can be other colors.
Lion	The name for any Clarity model beginning WN-6720.
Margay	Model WN-5040-720, a DLP™ optical engine with one lamp and a resolution of 1280 × 720
module	A stand-alone electronic assembly. Clarity displays are designed to be serviced at the module level, not the component level. That is, the technician changes the whole electronics module rather than changing a small part in it.
mullion	The metal edge surrounding the screen material that holds the screen in place.

Term	Meaning
native resolution	The resolution of the LCD or DMD itself. This is the highest resolution the display can show, but in some products the display will accept higher resolutions an
NTSC	The television system used in North America, Japan and parts of South America. It stands for National Television Systems Committee, the group that originally approved it. See also PAL and SECAM.
PAL	The television system used in most of the world. It stands for Phase Alternation Line. See also NTSC and SECAM.
Panther	The name for any Clarity model beginning WN-67**4**0 or WN-67**3**0.
power supply	The device that converts the mains AC voltage to other voltages that the rest of the display can use.
Puma	The name for any Clarity model beginning with WN-5020 or WN-5010.
Puma UXP	Puma with 2 lamps, 1600 × 1200 LCD. WN-5020-UXP
Puma X	Same as Puma XP, but with only one lamp. Upgrade kit can add the second lamp, making it a Puma XP.
Puma XP	Puma with 2 lamps, 1024 × 768 LCD. Accepts up to 1600 × 1200 and down converts to LCD’s resolution.
remote	The remote control.
RGB	Red, green, blue; three parts of a video signal sent on separate wires. *See also* YPbPr.
RGBHV	RGB plus sync, where H and V sync are on separate wires.
RGBS	RGB plus sync, where composite sync is on a separate wire.
R-Y	One of the components of “component” video. *See also* component video *and* colorspace.

Term	Meaning
SECAM	The television system used primarily in France, Russia and the former Soviet Bloc countries. Sequential Color and Memory. See also NTSC and PAL.
slot	A memory location; the numbered location in memory
SOG	Sync on green, usually for RGB sources
source	A source of pictures, such as a computer, a VCR, a DVD player or the loop-thru from another Clarity cube.
stack	A group of displays physically bolted together forming a wall.
strike	lighting a lamp or trying to light a lamp
SVGA	Super VGA, a standard for distributing analog computer pictures with a resolution of 800 pixels by 600 pixels.
S-Video	A video distribution system in which the luminance (brightness) and chrominance (color) are sent on separate wires. Short for Super Video.
SXGA	Super extended VGA, a standard for distributing analog computer pictures with a resolution of 1280 pixels by 1024 pixels.
sync on green	The sync part of the signal is combined with the green channel in RGB video. Also called SOG.
Tigress	The name for any Clarity model beginning with WN-5230. The original Tigress, no longer produced, has been replaced by the Tigress S and Tigress X, whose model numbers start with WN-5230**A**.
unit	One complete display. *See also* cube; display.
UXGA	Ultra-extended VGA, a standard for distributing analog computer pictures with a resolution of 1600 pixels by 1200 pixels.

Term	Meaning
UXP	Refers to all Lions, Panthers, Pumas that do **have UXP** in their names and model numbers. These have illumination systems with two lamps. Lion UXP: WN-6720-UXP Panther UXP: PN-6740-UXP, PN-6730-UXP Puma UXP: WN-5020-UXP *See also* non-UXP.
VGA	Video Graphics Adapter, a standard for distributing analog computer pictures with a resolution of 640 pixels by 480 pixels.
video	In this manual, video means NTSC, PAL or SECAM pictures.
video input module	See VIM
VIM	Video Input Module: an optional board which plugs into the electronics module that allows S-Video and composite video inputs.
wall	A group of displays physically bolted together. (Not possible with Panthers.)
Wildcat	The name for any Clarity model beginning WN-4030.
WXGA	Wide XGA, a standard for distributing analog computer pictures with a resolution of 1280 pixels by 768 pixels.
XGA	eXtended VGA, a standard for distributing analog computer pictures with a resolution of 1024 pixels by 768 pixels.
Y	One of the components of "component" video. *See also* component video *and* colorspace.
YPbPr	Designators for the three conductors in component video. Y = luminace signal Pb = B-Y (blue – luminance) signal Pr = R-Y (red – luminance) signal

6.8 Specifications for Puma

Specifications apply to all Pumas except as noted for specific models: Puma X, Puma XP and Puma UXP.

Mechanical

Specification	Maximum	Minimum	Typical	Notes
Outside dimensions				
Width	40"			1016 mm
Height	44.75"			1137 mm
Depth	30.5"			775 mm
Weight, fully assembled	160 lbs			72.7 kg
Shipping weight				
Stacking				
Horizontal	Unlimited			
Vertical	4			Higher walls may need additional support
Orientation	20°			Tilt of top surface plane on any axis
Chassis color			Black	
Ventilation requirement Rear clearance		6"		When air intake chimney is blocked at top (see “Installing Chimney Covers & Tie-backs” on page 24).
Screen size				Aspect ratio 4×3 (1.33)
Diagonal	50"			1270 mm
Width	40"			1016 mm
Height	30"			762 mm
Mullion, SCN-5250-GV, -GC (glass)			0.070"	1.5 mm
screen-to-screen gap			0.160"	4.0 mm
Mullion, SCN-5250-AG (acrylic)			0.020"	0.5 mm
screen-to-screen gap			0.070"	1.7 mm

Electrical and Heat (Continued)

Specification	Maximum	Minimum	Typical	Notes
Video input amplitude				
Separate RGB analog	1.0 V p-p	0.5 V p-p	0.7 V p-p	75 ohm termination
Composite analog	5.0 V p-p		0.3 V p-p	75 ohm termination
TTL H and V sync	5.0 V	2.5 V	3.5 V	TTL at 330 ohm termination
Input connectors				
15-pin D-sub female				Analog 1, Analog 2, In and Out
DVI				Digital In and Out; DVI standard
BNC (optional)				Composite video
4-pin DIN (optional)				S-Video In and Out
RJ45				RS232 In and Out
Frequency, vertical	120 Hz	56 Hz		
Frequency, horizontal	91.1 kHz	31.47 kHz		

Electrical and Heat (Continued)

Specification	Maximum	Minimum	Typical	Notes
Dot clock	165 MHz			
AC requirements				
Line voltage 115 V range	120 V	100 V		45–65 Hz auto-ranging, power factor corrected
230 V range	240 V	200 V		
Line current				
115 V, 2 lamps			4.3 A	
115V, 1 lamp			2.6 A	
230 V, 2 lamps			2.2 A	
230 V, 1 lamp			1.3 A	
Power				
2 lamps			500 W	
1 lamp			300 W	
Heat, BTUs per hour				
2 lamps			1700	
1 lamp			1020	

Optical (Continued)

Specification	Maximum	Minimum	Typical	Notes
Image position	+1 pixel	–1 pixel	0 pixel	
Rotation	– ½ pixel	+½ pixel	0 pixel	
Pincushion/Barrel	–1 pixel	+1 pixel	0 pixel	
Keystoning	–1 pixel	+1 pixel	0 pixel	
Focus/Aberration				No objectionable defocusing or chromatic aberration at distance of 1.5 screen diagonals by a 20/20 vision viewer
Brightness (all available lamps)				
Puma X (one lamp)				
4.0 gain acrylic screen			158 fl	
1.7 gain glass screen			62 fl	
1.0 gain glass screen			36 fl	
Puma XP (using two lamps)				
4.0 gain acrylic screen			316 fl	
1.7 gain glass screen			124 fl	
1.0 gain glass screen			72 fl	
Puma UXP (using two lamps)				
4.0 gain acrylic screen			251 fl	
1.7 gain glass screen			96 fl	
1.0 gain glass screen			57 fl	
Screen, Wide-view glass				Screen type SCN-5010-GV
Gain			1.0±10%	
Viewing angle, ½ gain, H & V			80°	±40°
Viewing angle, ⅕ gain, H & V			135°	±67.5°

Optical (Continued)

Specification	Maximum	Minimum	Typical	Notes
Quality View Metric (QVM)[1]			990	
Screen, High-gain acrylic				Screen type SCN-5010-AG
Gain			4.0	
Viewing angle, H, ½ gain			66°	±33°
Viewing angle, V, ½ gain			20°	±10°
Viewing angle, H, ⅕ gain			90°	± 45°
Viewing angle, V, ⅕ gain			34°	± 17°
Quality View Metric (QVM)[1]			280	
Screen, High-contrast glass				Screen type SCN-5010-GC
Gain			1.7±10%	
Viewing cone, ½ gain, H & V			70°	±35°
Viewing cone, ⅕ gain, H & V			90°	±45°
Quality View Metric (QVM)[1]			450	
Brightness uniformity, any screen			> 75%	ANSI 13-point standard, with 2 lamps
Contrast ratio			>1200:1	Dark room
Resolution, Puma X & XP				1024 × 768 pixels
Resolution, Puma UXP				1600 × 1200 pixels
Lamp life, median 200W high pressure mercury			8000[2]	Hours

1. Clarity's Quality Viewing Metric (QVM) is a comprehensive measure of image quality. It combines the effects of brightness, contrast and ambient light to yield a more meaningful measurement for evaluating perceived image quality. See technology notes on image quality at www.ClarityVisual.com/technotes.
2. Median lamp life means 50% of large sample of lamps are still operational after 8000 hours of use.

Environmental

Specification		Maximum	Minimum	Typical	Notes
Temperature	operating	35° C, 95° F	0° C, 32° F		All performance specifications are maintained within this temperature range
	non-operating	60° C, 140° F	–10° C, 14° F		
Altitude (barometric pressure)		10,000 ft			Above sea level, or equivalent barometric pressure
Humidity		80% R.H.	20% R.H.		35° C non-condensing

Index

Symbols

#50 Glass Cleaner, 90

Numbers

4×3 aspect ratio, definition of, 138

A

AC input, 35
AC power access door, 34
AC power requirements, 143
acrylic screen, opening, 78
address, definition of, 113
adjusting levels, manually for computer sources, 101
adjusting levels, semi-automatic for computer sources, 101
air exhaust chimney, 34
air filters, changing, 88
air intake chimney, 34
air, intake, temperature, 108
alignment, LCD, menu, 115
ambient operating temperature, 144
amplitude, video input, 142
analog mode table
    horizontal resolution, 122
    mode ID, 125
any fan stopped, on-screen code for, 14
arrow buttons, 120, 121
aspect ratio, 97
aspect ratio, definition of, 138
auto codes, 110
auto lamp on, 16, 23, 112
    power up sequence with, 23
auto setup options
    menu, 114

B

ballast, 64
    fan, 36
    fan, replacing, 64
    replacing, 54
ballast 1, 36, 38
    fan, 36, 38
    location, 104
ballast 2, 36, 38
    fan, 38
ballast, definition of, 138
beep, 4
beeper, 110
big picture, 97
big picture key, definition of, 138
big picture, definition of, 138
black line at edge of screen, 28
black, screen is, 20, 28
blue only, 103
board temperature, 108
Bobcat, definition of, 138
both lamps failed, on-screen code for, 14
brightness
    specification for, 143
BTUs/hour, 1 lamp, 143
BTUs/hour, 2 lamps, 143
buttons, arrow, 120, 121
buttons, remote control, 118
B-Y, definition of, 138
bypass jumpers for lamp/intake fans, 56
bypassing interlocks, 24
bytes received, 105
bytes sent, 105

C

cable, power supply, 52
cables
    for RS232, straight-thru, 134
calibrating LCD, 18
calibrating YPbPr, 18
certifications, 136
changing
    air filters, 88
    ColorPlus filter, 86
    lamp, 80
    rotator, 86
Claire #50 glass cleaner, 90
cleaning screens, mirrors, 90
cleaning the screen, 90
clearance, rear, 142
clearing last 10 inputs from memory, 18
closing the screen, 40, 78
color balance
    menu, 111
ColorPlus™ filter, 86
colorspace, 101, 102
    definition of, 138
column, 97
column in wall mode, 97
commands received, 105
component video, definition of, 138
composite sync, definition of, 138
composite video, definition of, 138
conformity, declaration of, 136
connector diagrams, 134
crop, 97
cube status, 104
cube, definition of, 138
current data in memory, 100
current, maximum, 143
curtain, 120
    pattern, 110
C-Video, definition of, 138

D

DA, definition of, 138
declaration of conformity, 136
defaults, reset to factory, 18

definitions of terms, 138
delete menu, 98
depth, outside, inches, 142
depth, outside, mm, 142
diagnostics menu, 106
diagram, connector wiring, 134
diagrams of connectors, 134
digital levels, 102
dimensions, 130, 142
display, definition of, 138
do black level/while level, 114
do frequency, 114
do phase, 114
do position, 114
document number, i
dot clock, 143
drawings, 130
DVI, 2
DVI, definition of, 138

E
electrical specifications, 142
electronics module, 35
  access door, 34
  replacing, 50
  temperature, 108
electronics module, definition of, 139
enter button, 5, 121
environmental specifications, 144
exhaust fan, 38
  cable, 58
  replacing, 58

F
factory defaults, reset to, 18
factory settings menu, 18
failed lam, indication, 104
fan
  board, 37
  lamp, 104
  location of, 26
  status, 104
  which failed, 26
  which one failed?, 56, 63
fan LEDs, 16
fast key, definition of, 139
fault override, 6
FCC regulations, 136
feedback about this manual, v
fill all, 97
filter, ColorPlus™, 86
firmware, revision, number of, 117
fixing image problems, 28
flip, horizontal and vertical, 18
freq/phase button, 121
frequency, max/min, 142
Fresnel lens, definition of, 139
front cable access, 34
front service, 34
functions, remote control, 118

G
gain, screen, 143, 144
gamma, 18
Glass Wax™, 90
global, 105
glossary, 138
gray balance, 111
group ID, 113
guidelines for routine maintenance, 76

H
H & V sync, definition of, 139
H position, 116
heat from displays, 143
height, outside, inches, 142
height, outside, mm, 142
height, wall, 97
horizontal edge LCD, 115
horizontal flip, 18
hours
  lamp, 109
  lamp, resetting, 84
  running time, 109
  system time, 109

I
ID, definition of, 113
image alignment, 115
Image Problems, fixing, 28
input amplitude, 142
input levels
  computer sources, 101
  digital sources, 102
  video sources, 103
inputs, clearing last 10 from memory, 18
installing a lamp, 82
intake air temperature, 108
  sensor, 37
intake air temperature sensor, 66
intake and lamp fans, 27
intake fan
  connector, 56
  replacing, 56
interloc
  k monitoring, 18
interlock, 37, 104
  open, 24
  open, on-screen code for, 14
interlock bypass, 24
interlock, light shield, 16
interlocks, 16
IR receiver, 35

J
justify, 97

K
key, definition of, 139

keyhole slot in light shield, 43
keys, arrow, 120, 121
keystone, definition of, 139

L

lamp
1, 36, 38
2, 36, 38
ballast, replacing, 54
changing, 80
count, 112
failure to strike, 16
fan connectors, 56
fans, 27, 38, 104
fans, replacing, 56
hours, 109
hours, resetting, 84
how it strikes, 22
installed, number of, 18
installing, 82
lamps on in diagnostic code, 15
life, 144
life, definition of, 139
location of #1 & #2, 104
off (lamp saver), on-screen code for, 14
off (ready), on-screen code for, 14
off sequence, 23
off, on-screen code for, 14
on sequence, 16
on, no alarms, on-screen code for, 14
on/off button, 118
removing, 82
saver, 112
screw, 82
service, 18
settings menu, 112
status, 104
tabs, 82
temperature, 108
temperature sensor, 66
type, 144
will not strike, 24
large mirror, 35
last fault, 104
last packet address, 105
last packet type, 105
LCD
& PS fans, board, 37
alignment, 115
cable, 50
cable not connected, 21
calibration, 18
fans, 37
fans, replacing, 62
LEDs, 35
definition of, 139
for lamp/intake fans, 56
meaning of, 17, 25
reading the, 16
ready, 24
left edge, 115
left or right side?, 34
leg rest, 34
legs, 34
letterbox, 97
level
computer sources, adjusting to, 101
digital sources, adjusting to, 102
video sources, adjusting to, 103
level button, 118
lifting handles, 34
light shield, 35, 36
interlock, 16
interlock switch, 56
Light shield screws, 47
light tower, 35, 36, 37
cover, 81
lowering, 46
raising / lowering, 84
replacing, 48
screw, 56
stops, 36, 46, 47
Lion, definition of, 139
lockout, 24
logo, splash screen, 18
lost signal, retry on, 114
lowering the light tower, 46

M

main AC power switch, 35
maintenance, routine, 76
manual adjustment of levels for computer sources, 101
manual, feedback about this, v
manufacturer's address, 136
Margay, definition of, 139
meaning of LEDs, 17, 25
meanings of terms, 138
measurements, 130
mechanical specifications, 142
memor
clearing last 10 inputs, 18
memory
current data in, 100
menu, 98
number of, 100
overwriting a, 100
recalling a, 99
saving to a, 100
slots, 98, 99, 100

menu
auto setup options, 114
button, 5
chains, diagrams of, 118
color balance, 111
delete, 98
diagnostics, 106
factory settings, 18
H position, 116
lamp settings, 112
LCD alignment, 115
memory, 98
menu options, 116
miscellaneous options, 110
not visible, 21
picture, 94
picture position, 95
position, 95
recall, 99
save, 100
serial port settings, 113
serial port status, 105
service, *see* factory service menu, 18
setup summary, 107
structure of, 94
test pattern, 106
timeout, 116
V position, 116
zoom, 95
mirror, cleaning, 90
misc menu chain, 119
miscellaneous options menu, 110
mode ID, 104
mode table, analog
horizontal resolution, 122
mode ID, 125
model name, location of, 153
model number, location of, 153
module, definition of, 139
monitor button, 15
monitor menu chain, 119
monitoring interlocks, 18
monitoring temperature, 14, 108
most recent fault, 105
mullion
acrylic, inches, 142
acrylic, mm, 142
definition of, 139
glass, inches, 142
glass, mm, 142
width, 142

N

name, memory slot, 100
native resolution, 117
native resolution, definition of, 139
normal power up sequence, 22
normal startup sequence, 22
not addressed, 105
not this cube, 105
NTSC, definition of, 139
number of lamps installed, 18

O

objective (output) lens, 35
one lamp failed, on-screen code for, 14
on-screen code, 14
on-screen LEDs, 35
location of, 51
opening an acrylic screen, 78
opening the screen, 40, 78
operating temperature, 144
optical specifications, 143
optics fan, 36, 37
cable, 46
replacing, 60
over temp shutdown, 66
over temperature monitoring, 108
over temperature, shutdown on, 108
overwriting a memory, 100

P

PAL, definition of, 139
Panther, definition of, 139
picture
distorted, noisy, 28
menu, 94
position menu, 95
stretched or chopped off, 28
position
picture, 95
power
max, 1 lamp, 143
max, 2 lamps, 143
requirements, 143
supply, definition of, 139
up sequence, 16
power supply
cable, 52
cover, 35, 36, 53
fan, 37
connector, 62
replacing, 62
replacing, 52
temperature, 108
power up, normal sequence, 22
prev button, 5, 121
problem, startup, 20
program information, 117
Puma
definition of, 139
UXP, definition of, 139
X, definition of, 139
XP, definition of, 139
Puma UXP, 2
Puma X, 2
Puma XP, 2
pusher, acrylic screen, operating the, 40, 78

Q

quality viewing metric, 144
QVM, 144

R

raising the light tower, 84
reading LEDs, 16
ready LED, 16, 24
rear clearance, 142
rear cover interlock, 16
rear panel, replacing, 44
rear service, 34
rear turn mirror, 35, 36
regulatory information, 136
remote
    buttons on, 5
remote buttons
    monitor, 15
remote control, 4, 118
    arrow keys, 120, 121
    color balance, 111
    curtain, 120
    delete, 98
    enter, 121
    freq/phase, 94, 121
    lamp, 118
    lamp on/off, 118
    level, 118
    menu, 118
    misc, 119
    monitor, 119
    on/off, 118
    prev, 121
    recall, 98
    save, 98, 119
    setup, 120
    size/pos, 118
    source, 119
    wall, 97, 120
remote IR cable, 50, 51
remote, definition of, 139
removing a lamp, 82
removing the rear panel, 44
removing the screen, 42
removing, see *replacing*, 34
replacing
    air filters, 88
    ballast fans, 64
    exhaust fan, 58
    filters, 88
    intake fan, 56
    lamp, 80
    lamp ballast, 54
    lamp fans, 56
    LCD fans, 62
    light tower, 48
    optics fan, 60
    power supply, 52
    power supply fan, 62
reset all windows, 96
reset to factory defaults, 18
resets, watchdog, 18
resolution, 2
resolution native, 117
    definition of, 139
retry on lost signal, 114
RGB levels, 101
RGB, definition of, 139
RGBHV, definition of, 139
RGBS, definition of, 139
right edge, LCD, 115
right or left side?, 34
rotator, 86
routine maintenance, 76
row in wall mode, 97
RS232
    straight-thru cables for, 134
running time, 109
R-Y, definition of, 139

S

safety
    regulatory specifications, 136
save
    button, 119
    menu, 100
    menu chain, 119
scale mode, 28, 97
screen
    black, 20, 28
    cleaners, 90
    cleaning, 90
    fit problem, 32
    gain, 143, 144
    logo, 18
    opening and closing, 40, 78
    opening, acrylic, 78
    prop, 41, 43
    removing, 42
    size, 142
    white, 21, 28
screen-to-screen gap, 142
SECAM, definition of, 140
selecting the source, 94
semi-automatic level adjustment for computer sources, 101
sensor
    temperature, 108
sensors, temperature, 66
sequence, startup, 16
serial number, location in rear, 45
serial number, location inside, 38
serial number, location of, 153
serial port
    settings menu, 113
    status menu, 105
service menu, *see* factory service menu, 18
service, front or rear, 34
setup button, 120

setup summary, menu, 107
shipping weight, kg, 142
shipping weight, lbs, 142
shoulder nut, 43
shutdown on over temperature, 66, 108
side 1, side 2 defined, 34
signal, lost, retry on, 114
size/pos
  button, 95, 118
  menu chain, 118
slot
  definition of, 140
  memory, 98, 99, 100
  name of, 100
SOG, definition of, 140
source
  absent, timeout of lamps, 112
  button, 119
  definition of, 140
  selecting, 94
space behind Puma, 142
specifications, 142
  electrical, 142
  environmental, 144
  mechanical, 142
  optical, 143
splash screen logo, 18
Sprayway #50 glass cleaner, 90
stack, definition of, 140
standby state indicated in diagnostic code, 15
startup problem, 20
startup sequence, 16, 22
straight-thru cables for RS232, 134
strike, definition of, 140
striking a lamp, how it happens, 22
support, technical, 153
SVGA, definition of, 140
S-Video, definition of, 140
SXGA, definition of, 140
sync
  composite, definition of, 138
  H & V, definition of, 139
sync on green, definition of, 140
sync, loss of, 114
system hours, 109
system time, 109

T

table, analog mode
  horizontal resolution, 122
  mode ID, 125
technical support, 153
temperature
  monitoring, 14, 108
  near limit, on-screen code for, 14
  operating, 144
  over limit, on-screen code for, 14
  over, shutdown on, 66
  sensors, 66, 108
  shutdown on, 108
  too high, 24
terms used in this manual, meanings of, 138
test pattern menu, 106
this cube alone, 105
Tigress, definition of, 140
timeout, menu, 116
triple beep, 4

U

unit
  column & row, 97
  ID, 113
unit, definition of, 140
UXGA, definition of, 140
UXP, definition of, 140

V

V position, 116
ventilation requirement, 142
vertical flip, 18
VGA, definition of, 140
video
  composite, definition of, 138
  definition of, 140
  input amplitude, 142
  input module, definition of, 140
video input types, 2
viewing angle, 143, 144
viewport, 96
VIM, definition of, 140

W

wait, on-screen code for, 14
waiting period, 24
wall
  button, 120
  definition of, 140
  mechanical problems with, 32
  mode, 97
  size, 97
watchdog resets, 18
weight, 2, 142
  kg, 142
  lbs, 142
when to change
  air filters, 88
  ColorPlus filter, 86
  lamp, 80
  rotator, 86
where the fans are, 26
which fan failed, 26

which fan failed?, 56, 63
white balance (color balance), 111
white, screen is, 21, 28
widescreen, 97
width
    outside, inches, 142
    outside, mm, 142
width, wall, 97
Wildcat, definition of, 140
wiring of connectors, 134
wiring, connectors, 134
WN-5020-UXP, 2
WN-5020-X, 2
WN-5020-XP, 2
words used in this manual, meanings of, 138
WXGA, definition of, 140

X

XGA, definition of, 140

Y

Y, definition of, 140
YPbPr calibration, 18
YPbPr levels, 101
YPbPr, definition of, 140

Z

zoom menu, 95

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Having trouble?

Most questions are probably answered somewhere in this manual. Check the Index.

If the problem you have is completely baffling, call your Clarity reseller—the company that sold the Clarity display to you.

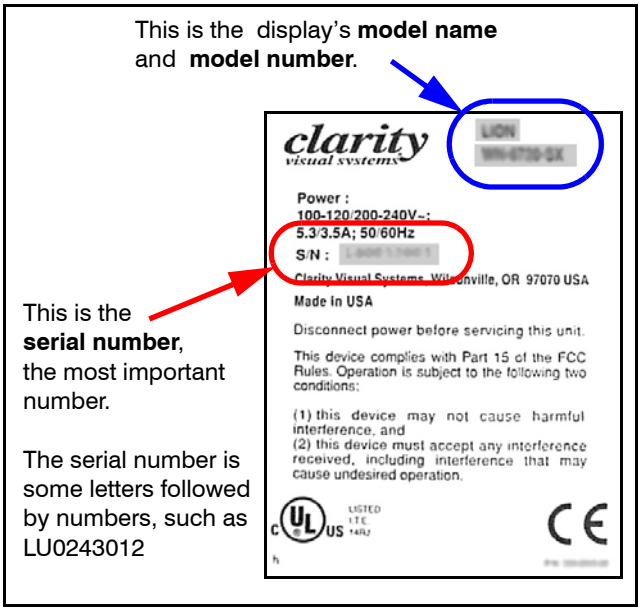
My Clarity Reseller is:

If you can't contact your reseller for some reason, Clarity's contact information is on the back cover of this manual.

But first!

Get the **serial number** of the unit you have. The serial number is found on a lable in these places:

Clarity Display	Serial Number Label Location	
	from rear	from front
Bobcat	on the back panel	not available
Lion	on the back panel of the lower section	on the left wall of the Center Bay
Panther	on the back panel	not available
Puma	on the back panel	on the left wall
Wildcat	on the back panel	on the left wall
Margay	on back of electronics door	behind electronics door
Bay Cat	on the back panel	not available
Bengal	on right above electronics	on left behind screen, above electronics


This is the display's **model name** and **model number**.
clarity visual systems
LION
Power :
100-120/200-240V~;
5.3/3.5A; 50/60Hz
S/N :
Made in USA
Disconnect power before servicing this unit.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
This is the **serial number**, the most important number.
The serial number is some letters followed by numbers, such as LU0243012

Describe the problem

Try to describe the problem in the most precise language you can. Remember, the person you are talking to or writing to can't see what you see. Try to use helpful language.

Un-helpful language:

- It looks funny.
- The picture doesn't look right.
- The image is bad.
- It isn't working.

Helpful language:

- I see horizontal streaks coming from the right side of high contrast edges.
- I see a solid green background has vertical bands in it.
- Whenever I try to "_____", I get a message on the screen that says "_____".
- The lamp will not turn on. When I changed it with another lamp, it still did not turn on.
- There is a black line on the left side, and I can't move the picture over there with the Position control.
- I see flashing red and amber lights on the screen. (Note the sequence of the colored lights. It's important.)

©2004 Clarity Visual Systems, Inc. All rights reserved

27350 SW 95th Avenue, Suite 3038
Wilsonville, OR 97070-7708
Main Phone: +1 503 570 0700 • Customer Service Phone: +1 503 570 4634 • Fax: +1 503 570 4657
www.ClarityVisual.com • Service@ClarityVisual.com

clarity®
visual systems